Assessment of the national research organizations

ASSESSMENT REPORT OF THE *INSTITUT PASTEUR*

December 2024

High Council for evaluation of research and higher education

On behalf of the committee of experts:

Liam Smeeth, chairman of the assessment committee

On behalf of *Hcéres*:

Stéphane Le Bouler, interim president of *Hcéres*

In application of articles R. 114-10 and R. 114-15 of the French Research Code, the assessment reports are signed by the chairperson of the assessment committee and countersigned by the president of *Hcéres*.

Executive summary

The *Institut Pasteur* is a private foundation recognized as being of public interest. As stated in Article 1 of its bylaws, its purpose, in France and internationally, is

- development and conduct of research in all fields of biological sciences which may contribute, directly or indirectly, to progress in human health, and in particular in the field of infectious diseases;
- teaching and training relating to the above-mentioned research activities;
- conduct of and support for public health actions;
- development of innovation and knowledge transfer for the purpose of applications seeking to prevent or cure diseases, particularly infectious and parasitic diseases and immunological illnesses or, more broadly, to improve health.

Research at the *Institut Pasteur* is organized into 142 research teams and 12 scientific departments. It has multiple partnerships with French national research organizations (*CNRS*, Inserm, etc.), universities (notably *Université Paris-Cité*) and hospitals (notably, *Assistance publique - Hôpitaux de Paris)*. It also hosts 13 national reference centres appointed by the French ministry of health and 7 collaborating centres of the World Health Organization. It is part of the Pasteur network, a worldwide platform for cooperation in health research and public health.

The Institute had a budget of €334 million in operating expenses in 2022. The Institute's staff represented 2,388 people, including 1,657 permanent staff and 731 non-permanent staff. Together with around 500 employees of partner institutions (mainly *CNRS*, *Inserm* and *Université Paris-Cité*), almost 2,900 people of over 70 nationalities work on the Pasteur campus in intramural Paris.

* * *

The international assessment committee was tasked by the High Council for evaluation of research and higher education (Hcéres) with conducting an external assessment of the *Institut Pasteur* for the 2018-2022 period. [1] The assessment process entailed a review of a self-assessment report that was prepared by the Institute, and a succession of committee meetings prior to a three-day visit that occurred in June 2024. The agenda for the in-person visit included extensive discussions with the Institute's leadership, and meetings with partners; more details are provided at the end of the report. The assessment committee is very grateful for the support it received from Hcéres and from the *Institut Pasteur* over the course of the review.

* * *

The whole committee agreed that the *Institut Pasteur* has a well-established reputation as leading health research institution with a strong track record of important scientific contributions.

The main content of the assessment report can be summarized as follows:

- Research and scientific policy
  While acknowledging that the *Institut Pasteur* enjoys a very high reputation for scientific excellence in the international community, the assessment committee carefully examined how the Institute makes – or not – every effort to maintain the quality of its research at the very highest international level. The committee makes a number of suggestions to further improve the Institute's processes for research assessment, and it encourages the Institute to improve its capacity to measure the scientific impact of its research and to develop comparisons with leading European and international research institutions. Also the committee recommends that the Institute clarify its vision of its role, develop synergies between its four missions – research, training, public health and innovation – and define a small number of priorities in areas where it is well placed to make major contributions, namely vector-borne diseases and infectious diseases.

- The *Institut Pasteur* in society
  Beyond research, the report reviews the *Institut Pasteur*'s activities that contribute to its impact for society. These include its contribution to public health, with a particular attention paid to the Institute's contributions in the Covid-19 crisis, and to its work and projects on vaccine development. The committee also examined the Institute's involvement in innovation projects and partnerships with private companies, in training activities and in sharing scientific knowledge with society. The assessment committee welcomes the quality of the Institute's commitment in these activities and makes a number of suggestions to further improving their impact.

[1] This was the first ever assessment of the Institute. Since 2013, one of the missions of *Hcéres* has been to assess private-sector institutions that receive public funding for research, but it had not previously undertaken an assessment of the *Institut Pasteur*.

- Position and partnerships in France, Europe and internationally
  The assessment committee reviewed the *Institut Pasteur*'s position in the national context. It recommends that the Institute build on its recent commitment to a strong partnership with *Université Paris Cité*, and that the two partners define an ambitious joint strategy. It suggests that the Institute increase its openness and partnerships, clarify its position in the fields of research and health in France, and improve its ability to contribute to the government policies in these fields. Concerning the European level, the committee welcomes the growing success of the Institute's teams in European research programmes over the past five years, but it considers that the *Institut Pasteur* should develop an ambitious strategy to act as a European leader in the field of health. Furthermore, the assessment committee recognizes the reconfigured Pasteur network – with new governance, a new strategy and new modes of operation – as a major asset that may enable the *Institut Pasteur* – in its new role within the network – to achieve more in research and public health worldwide.

- Governance, organization, management and operations
  The research teams at the *Institut Pasteur* enjoy a very high quality of support, but the internal organization appears complex and to some extent fragmented. Resource allocation is a centralized and under-used management tool. These internal factors have limited the Institute's ability to implement its strategy, and internal reforms will help to lead the *Institut Pasteur* towards future success: the Institute should improve objective-setting and monitoring, involve more scientists in defining objectives and priorities, and decentralize management. The assessment committee welcomes some remarkable achievements of the human resources policy, such as support to professional development of young scientists, but it also notes that the *Institut Pasteur* is not fully prepared to meet the challenge of many retirements of senior researchers in the coming years; the Institute needs to improve its ability to attract mid-level and senior scientists. Lastly, financial sustainability is a well-identified issue: the Institute should improve its budgetary management, both for forecasting and monitoring expenses, and increase cost recovery for contract research activities.

The assessment committee identified 7 main recommendations that are intended to help strengthen the *Institut Pasteur* and its future development (see page 5). It also identified the main strengths and weaknesses of the Institute (see the conclusion of this report).

Main recommendations

The *Institut Pasteur* is one of the leading health research institutions globally with a well-established reputation for excellence. The staff at the Institute are dedicated and committed to continuing its important work. With continued public financial support, the Institute is well placed to make major contributions to medical science and human health. The recommendations included in this report should not be viewed as criticism; rather they suggest changes and actions that will help strengthen the Institute and its future development.

The major recommendations are presented below. More specific recommendations and suggestions are included in the report.

Recommendation 1	Reflect on the Institute's main missions (research, innovation, training and public health), reaffirm or redefine its position and how it exercises them, and clearly communicate externally. This will help ensure a better match between what the *Institut Pasteur* does and does not do and the public and government perception of its role. (see *chapters 1, 2 and 3*)
Recommendation 2	Reinforce the quest for world-class research excellence and focus on areas where the *Institut Pasteur* is well placed to make major contributions. (see *chapter 1*)
Recommendation 3	Integrate management and operations with the scientific strategy, develop performance indicators that support aligning the allocation of resources towards scientific ambitions, while also measuring the output in terms of results, value for money and impact for society. (see *chapters 2 and 4*)
Recommendation 4	Increase the Institute's outward-facing position and openness, and increase its partnership activities with national and international organizations. Combining different kinds of expertise is expected to yield a wider range of discoveries and greater benefits for health. The *Institut Pasteur* has the history, stature and unique qualities to assume a coordinating role in European research projects in major areas. (see *chapters 1, 2 and 3*)
Recommendation 5	Continue the reforms of the Pasteur network already underway towards a multilateral, more equitable partnership model. Strongly encourage joint working where scientific objectives align, and mutual movement of staff between different members of the network. (see *chapter 3*)
Recommendation 6	Improve the attractiveness of senior positions to international researchers and work towards a more open, diverse and inclusive workforce in order to broaden the experience and expertise of the staff body. (see *chapter 4*)
Recommendation 7	Further develop fundraising and commercialization to reinforce financial sustainability, and improve the cost recovery from contract research activities. (see *chapter 4*)

Table of contents

Introduction

1 / Composition of the assessment committee

The assessment committee included 8 experts:

- Liam SMEETH, director of the London school of hygiene and tropical medicine, United Kingdom, chair of the assessment committee;
- Michel EDDI, former senior officer for sustainable development at the French ministry of higher education and research, former chairman and chief executive officer of *Cirad* (the French agricultural research centre for international development), vice-chair of the assessment committee;
- Anne BERTOLOTTI, head of the Neurobiology Division, MRC Laboratory of molecular biology, Cambridge, United Kingdom;
- Elena CATTANEO, professor of pharmacology and director of the Laboratory of stem cell biology and pharmacology of neurodegenerative diseases, University of Milano, Italy;
- Christopher DYE, professor of epidemiology, Oxford University, United Kingdom, and former director of strategy of the World Health Organization;
- Birgitta HENRIQUES-NORMARK, professor and senior consultant physician in clinical microbiology at *Karolinska Institutet* and Karolinska University Hospital, Stockholm, Sweden;
- Beate KAMPMANN, professor of global health and scientific director of the Charité centre for global health and the *Institut für internationale Gesundheit*, Berlin, Germany;
- Pietro LIÒ, professor of computational biology, University of Cambridge, United Kingdom.

A brief biography of each expert is given at the end of this report.

2 / Brief presentation of the *Institut Pasteur*

The *Institut Pasteur* is a private research institution, founded in 1887 following a national public call to sustain the fight against infectious diseases. It is now a private foundation recognized as being of public interest, which enables it to benefit from the generosity of the public.

As stated in Article 1 of its bylaws, the purpose of the *Institut Pasteur*, in France and internationally, is

- development and conduct of research in all fields of biological sciences which may contribute, directly or indirectly, to progress in human health, and in particular in the field of infectious diseases;
- teaching and training relating to the above-mentioned research activities;
- conduct of and support for public health actions;
- development of innovation and knowledge transfer for the purpose of applications seeking to prevent or cure diseases, particularly infectious and parasitic diseases and immunological illnesses or, more broadly, to improve health.

Research at the *Institut Pasteur* is conducted at all levels of life, from molecules to individuals and populations and relies on cutting-edge technological facilities. The Institute is organized into 142 research teams and 12 scientific departments. It has multiple partnerships with French national research organizations (*CNRS*, Inserm, etc.), universities (notably *Université Paris-Cité*) and hospitals (notably, *Assistance publique - Hôpitaux de Paris)*. It also hosts 7 collaborating centres of the World Health Organization, and it is part of the Pasteur network, a worldwide platform for cooperation in health research and public health.

The Institute had a budget of €334 million in operating expenses in 2022; about 50% (€168 million) of these expenses were devoted to staff salaries. The Institute's staff represented 2,388 people, including 1,657 permanent staff and 731 non-permanent staff. In particular, the permanent staff included 292 researchers, 314 engineers, 252 research technicians and 725 administrative staff; the non-permanent staff included 316 postdoctoral researchers and 188 PhD students. Together with around 500 employees of partner institutions (mainly *CNRS*, *Inserm* and *Université Paris-Cité*), almost 2,900 people of over 70 nationalities work on the Pasteur campus in intramural Paris.

3 / Context of the assessment

a/ Main elements of context

This was the first ever assessment of the *Institut Pasteur*.[2] *Hcéres* therefore chose to have an in-depth dialogue with the Institute's senior management beforehand, to discuss together the objectives, spirit, scope, content

[2] Since 2013, one of the missions of *Hcéres* has been to assess private-sector institutions that receive public funding for research, but it had not previously undertaken an assessment of the *Institut Pasteur*.

and process of the assessment. This dialogue took place in the second half of 2022 and first half of 2023. Very close attention was paid to tailoring this assessment to the Institute's specific features, in particular its identity as a private foundation recognized as being of public interest, and to its missions. As a result of these discussions, the '*Terms of reference for the assessment of the Institut Pasteur*' were written by *Hcéres*, in close collaboration with the management of the Institute, and published on the *Hcéres* website in June 2023.[3] They present the topics and criteria for the assessment – or, in mirror form, the elements expected in the Institute's self-assessment report. These Terms of reference stipulate that the reference period for the assessment is 2018-2022.

In the last months of 2022, *Hcéres* also collected the expectations of the Ministry of higher education and research regarding the assessment of the *Institut Pasteur* – in a meeting with the general director of research and innovation – as well as the expectations of the Ministry of health – in a meeting with the general director for health. A document summarizing these expectations was written by *Hcéres* and shared with the management of the *Institut Pasteur* in the first half of 2023 – ahead of the preparation of the self-assessment report. These expectations of the ministries mainly concern the Institute's scientific policy, its actions to ensure its research remains at the highest international level, its activities related to the development of new vaccines, its public health and innovation activities, the Pasteur network, the Institute's position in the French higher education and research system, its involvement in European cooperation and its economic model.

Another major element of context for this assessment was the change in the Institute's general management: the previous general director, Stewart Cole, completed his term on 31 December 2023, after 6 years in the post, and a new general director, Yasmine Belkaid, took office on 1 January 2024. Consequently, on the one hand, the self-assessment report – which was due to be delivered in December 2023 – was prepared under the leadership of the previous general director; on the other hand, the assessment committee met the new general director during its visit to the *Institut Pasteur* in June 2024, while she was in the process of preparing her project for the Institute's new strategic plan.

On the basis of the Terms of reference, the ministries' expectations and the self-assessment report, the assessment committee identified the following main topics examined in this report:

- research activities and research policy;
- other activities impacting society: public health, innovation, training, knowledge, research ethics and integrity;
- position and partnership at the national, European and international levels;
- governance, organization and management, human resources policy and financial sustainability.

b/ The self-assessment report

The self-assessment report (SAR) – produced during the tenure of the previous general director and delivered by the *Institut Pasteur* in January 2024 – was the main source of information for the expert committee at the beginning of its work. The main comments of the committee on the SAR are set out below. They were written taking into consideration that this report was the first ever SAR of the *Institut Pasteur*, and in view of helping the Institute for the elaboration of its next SAR.

- The SAR was clearly written, well documented, and easy to read; it carefully followed all items of the *Terms of reference* and reported on the Institute's actions and activities.
- The SAR was more descriptive, and sometimes promotional, than a critical self-appraisal. It said very little on what has not gone well and why – or on what has gone well and why – and it rarely identified where there is room for improvement.
- The SWOT (strengths-weaknesses-opportunities-threats) analysis given in the SAR was too brief; a deeper analysis of 'threats' and 'weaknesses' would have been useful.
- The SAR showed an institution with a strong legacy and tradition. It did not fully show an institution committed to transformative change.
- The SAR described the Institute's activities and actions, but it rarely described their results and very rarely tried to assess the impact of the activities (be it the scientific impact, the medical impact, the impact for society, etc.).
- The 2019-2023 strategic plan, provided as an Appendix to the SAR, seemed to have been written mainly for internal use; it was not very easy to read for external readers.

It is clear, however, that a great deal of work went into collecting the data and writing the SAR and its appendices. The committee thanks the *Institut Pasteur* for this work. It also thanks the Institute for its detailed written answers to all the written questions asked by the committee for more complete information.

[3] See https://www.hceres.fr/sites/default/files/media/downloads/terms-reference-assessment-institut-pasteur.pdf.

I. Research and scientific policy

1 / Research quality

The *Institut Pasteur* has a very high reputation for scientific excellence in the international community. It is clear however that a high reputation – and in particular a longstanding high reputation – is not in itself a guarantee of continued excellence. For this reason, the assessment committee carefully examined how the Institute makes – or not – every effort to maintain the quality of its research at the very highest international level.

a/ Research units and their evaluation

Research at the *Institut Pasteur* is essentially organized into small research units – often called 'research teams' in this report. There are four types of research units:

- A 10-year unit (U10) is created, after evaluation by the Scientific Council (SC), for a period of 10 years with an intermediate evaluation after 5 years, following the transformation of a G5 or U5, the re-creation of a U10, or following the publication of an international call for applications. The composition of a U10 at its creation is 8 people maximum. The creation is approved by the Board of directors (BoD). In 2023, the Institute had 99 U10.
- A junior 5-year group (G5) is created for 5 years following an international call for applications, and evaluation by the SC. Candidates must have obtained their PhD less than 8 years ago (G5) – or 12 years ago for a 'G5+'. The G5 and G5+ groups are composed of six and eight people respectively. The creation is approved by the BoD. In 2023, the Institute had 14 G5 or G5+.
- A 5-year unit (U5) is created for 5 years following an internal call for applications and after evaluation by the SC; this call is intended to promote the careers of researchers working on campus who wish to develop their research projects and who are not eligible for G5 or G5+ calls. A U5 is made up of 6 people. The creation of a U5 is approved by the BoD. In 2023, the Institute had 12 U5.
- A "laboratory" is created by decision of the general director for a period of two years, renewable once, to support a priority or innovative theme. At the end of its term, a laboratory may be transformed into U5 or U10 after evaluation of its research project by the SC. In 2023, the Institute had 10 laboratories.

Calls for the creation of new research units are either targeted on a given theme or 'open'. Over the 2018-2022 period, 31 new research units were created and 38 were closed. The assessment committee considers that this organization into small and autonomous units, created after competitive calls and evaluation of the research project, is healthy and dynamic. It noticed that 60% of the members of the SC work outside France (see section IV.1), and that the evaluation process of a research unit – at the unit's creation or after 5 years for a U10 – involves asking the advice of a minimum of 7 foreign experts (not members of the SC). This strongly suggests that the research units really are assessed according to the highest international standards.

The assessment committee considers that this evaluation process of the research units is the cornerstone of research excellence at the *Institut Pasteur* and deserves utmost attention. It recommends that the Institute take care of maintaining a high enough proportion of 'genuinely new' research units, *i.e.* units created with a newly-hired leader recruited following an international competitive call. It also suggests that the Institute do its best to lighten as much as possible the other evaluation processes – both at the level of the Institute's scientific departments and at the level of the mixed research units (*UMRs: unités mixtes de recherche*) with *CNRS* and *Inserm* – which appear to constitute an additional burden for the research teams.

b/ Scientists' recruitment and promotions

Apart from the leaders of new research units – whose recruitment is decided following the evaluation process by the SC – permanent scientists can also be recruited at the *Institut Pasteur* through another process, after a competitive call for applicants and evaluation by another body, the Scientific staff evaluation committee (*Comesp*); the recruitment decision is made by the general director. The *Comesp* is also in charge of advising general management on the promotion of permanent scientists, and it takes the advice of foreign experts into account in its evaluations of applications for promotion.

The assessment committee noticed that the *Comesp* has a very low proportion of non-French members. Moreover, it appears in the SAR that 100% of the 21 permanent scientists hired after evaluation by the *Comesp* in the 2018-2022 period were or had been post-doctoral researchers at the *Institut Pasteur* – and even in the same research unit in which they were recruited to a permanent position.[4] The assessment committee sees this as a sign of a regrettable lack of openness. **It strongly recommends that the evaluation processes for recruitment involve participation of foreign members in the *Comesp* and take into account the advice of foreign experts**.

[4] Source: SAR.

c/ Research production

The Terms of reference of the assessment included the question of the ability of the *Institut Pasteur* to assess the quality of its scientific production in the international context. The first answer given in the SAR is the percentage, 28%, of publications published in journals with an impact factor exceeding 10.[5] The SAR also asserts that the Institute is committed to encouraging a more inclusive approach to evaluation, valuing impact and diversity of research outputs.

As is done for the assessment of every national French research institution, the department of *Hcéres* called the *Observatoire des sciences et techniques* (*OST*) has produced a document entitled 'Analysis of the scientific and technological profile of the *Institut Pasteur*'.[6] This document provides indicators on three types of scientific and technological production by the Institute: scientific publications, projects of the European research Council (ERC) and patents. The bibliometric analyses use the publication database of *OST*, which is an enriched version of the Web of science (WoS). These analyses include comparisons with the following research institutions: *Institut Curie* (France), Francis Crick Institute (UK), Rockefeller University (USA), Scripps Research Institute (USA), Weizmann Institute (Israel), *École polytechnique fédérale de Lausanne* (*EPFL*, Switzerland) and Karolinska Institutet (Sweden). Some of the main learnings from these analyses can be summarized as follows:

- The share of international copublications in the publications of the Institute's research teams for the 2017-2021 period is 67%. This is above the same share for *Institut Curie* and France as a whole, and for the benchmark institutions in the USA and in Israel, but is below the same share for Francis Crick Institute, *EPFL* and Karolinska Institutet.
- The main partner countries in the Institute's international copublications are, in descending order, the USA, UK, Germany, Switzerland, the Netherlands and Canada. Within this list, Canada is the first country to have a member institution in the Pasteur network.
- When examining the thematic distribution of the publications in broad areas, one observes that among all the institutions in the sample, the *Institut Pasteur* has by far the largest share of publications in the area of 'Immunity, infection, immunotherapy' (45%),[7] the next largest shares in this area are those of Rockefeller University (17%), Scripps Research Institute (17%) and Francis Crick Institute (16%).
- The analysis also looks at publication impact indices[8] for the 2018-2021 period. The average impact index of the *Institut Pasteur* is close to 1.4; this is slightly above that of Karolinska Institutet (1.3), but is slightly below those of *Institut Curie* (1.5), *EPFL* (1.6), Scripps Research Institute and Weizmann Institute (1.7), and substantially below those of Francis Crick Institute (2.0) and Rockefeller University (2.3).

The committee encourages the *Institut Pasteur* to continue its reflections on the most relevant indicators and metrics and on the development of a more qualitative approach to measure and assess the scientific impact of its research. It also recommends pursuing efforts to develop comparisons with leading European and worldwide research institutions in the field of health. Developing these tools is a good way of making visible the quality of an institution's scientific output, and it will help the Institute to sustain the excellence of its research.

2 / Scientific policy

d/ The general vision

The *Institut Pasteur* has three basic aims:

- to generate new knowledge in areas chosen by and driven by the investigators,
- to undertake research in response to identified needs in France and beyond,
- and to play a role in the translation of research findings to public health, innovation and training.

The committee considers that the Institute could clarify how it sees the balance between these different roles. While continuing to pay utmost attention to bottom-up scientific approaches and to freedom for researchers, as well as its historical and paramount attachment to use-inspired basic research,[9] it could clarify its engagement in certain strategic scientific priorities with some top-down initiatives. The *continuum* from research to applications, and the *continuum* and synergies between its four missions, should also be affirmed at the core of the Institute's vision. The Institute is engaged in bridging basic and clinical research and could also clarify and strengthen its commitment to increase its impact on public health, innovation and training.

[5] Source: SAR. The SAR points out that the Institute is a signatory of Dora, the San Francisco Declaration on research assessment, which aims to end the practice of correlating the journal impact factor with merit.
[6] See https://bit.ly/analysis-institut-pasteur.
[7] The thematic distribution of publications is made using the nomenclature of the European research Council (ERC) in life sciences (LS). The main areas in which the Institute's teams publish are Immunity, infection, immunotherapy (LS6), Integrative biology (LS2), Molecules of life: biological mechanisms, structures and functions (LS1), and Cellular, developmental and regenerative biology (LS3).
[8] More precisely, these indices are the mean normalized citation scores in the life sciences domain of the ERC nomenclature. See Appendix 6 of the OST contribution.
[9] Source: SAR.

Having praised the organization in small and autonomous research units, the assessment committee wishes to add that the Institute could clarify its vision on the appropriate balance between 'freedom of researchers' and 'autonomy of research groups' on the one hand, and 'ability of the management of the Institute to mobilize several teams together and to lead big inter-unit – research or innovation – projects' on the other.

- On the side of 'freedom and bottom-up initiatives', it is not clear to the committee if enough is done on the campus to favour the emergence of new research topics and to facilitate scientific risk-taking.
- On the other side, it is clear that the Institute should aim to be more than the sum of its units. The committee is unable to ascertain whether enough is done to support teams' cooperation and synergies, and to coordinate the numerous initiatives taking place on the campus. Nor does it understand who is responsible for making sure that this overarching assembly of initiatives makes sense, and who manages the risk of redundancy and the risk of fragmentation.

The committee suggests that after elaborating on the Institute's vision with regard to these questions, the role of the directors of the scientific department could be clarified and strengthened.

e/ Scientific priorities

The previous strategic plan, for the 2019-2023 period, defined three scientific priorities: Emerging infectious diseases, Antimicrobial resistance, Brain connectivity and neurodegenerative diseases. These three areas were supplemented by two 'initiatives' in 2021: the Cancer initiative and the Vaccinology and immunotherapy initiative. The assessment committee makes several observations concerning these priorities:

- It heard from several people that the process for choosing these priorities was not clear, and that both the SC and the Scientific advisory board (SAB) of the Institute had not really been involved in the reflections.
- It does not understand why areas like neurodegenerative diseases and cancer, which have limited relation to the Institute's core expertise in infectious and vector-borne diseases, have been chosen as priorities. Of course, some key topics in the Institute's research, for instance immunology, do interrelate – even increasingly so – with cancer research, but the decision to prioritize 'cancer' as such raises a number of questions.
- Also, the committee does not understand the real purpose of setting priorities. The strategic plan did not clarify if this was a 'marketing issue', i.e. a choice to showcase certain themes addressed by the Institute; or if it was a commitment to increase research efforts on certain themes, with the objective of increased results and impact?[10]

The committee recommends that the next strategic plan identify a small number of scientific priorities chosen on the basis of the Institute's main scientific strengths, and set clear perspectives for each priority on how the Institute commits to increasing its efforts, with the objective of delivering over the coming years major new results for the benefit of science, society and patients. **The recommendation is to make choices while remaining focused on the Institute's main strengths**. A better link between the scientific priorities and the development of the Institute is also likely to be one way of increasing its attractiveness.

3 / Technology platforms

The *Institut Pasteur* has more than 30 technology platforms. Strengthening research capabilities and fostering innovation, these core facilities are grouped into 4 centres within the Technology department (TD).

- The Centre of technological resources and research covers a wide range of technological areas such as proteomic, genomic, photonic and ultrastructural imaging, biological screening, microfluidics, etc.
- The Centre for animal resources and research meets the needs of the Institute's research teams in terms of animal models and comprises six facilities.
- The Research and resources centre for scientific informatics, established in 2022, is composed of 5 teams working on bioinformatics and biostatistics, image analysis Hub, data management, high-performance computing, etc.
- The Biological resource centre, created in 2001, is a transversal biobank infrastructure that groups together and maintains the microbial and human specimen collections of the Institute.

In addition to its affiliation to one of these centres, each platform has a secondary affiliation to one of the Institute's scientific departments. It is worth noting, moreover, that the Centre for research on vector-borne diseases (*CMTV*), one of the two flagship projects of the Institute launched in the context of the 'Pasteur pandemic preparedness initiative' (P3I), has the objective of implementing cutting-edge technology platforms.

The TD was established in 2016 and has since been reorganized to give increased momentum to the Institute's core facilities. It is one of the largest departments of the Institute, with nearly 400 people. The team attached to a platform is typically composed of between 5 and 15 people, with the notable exceptions of the bioinformatics

[10] As an illustration, the strategic plan sets the objective of creating at least 2 research teams in each of the three priority areas over the 5-year period, which is a very modest objective (31 research groups were created over the period).

and biostatistics hub (with almost 50 people) and the central animal facility (with close to 70 people). The team of a core facility participates in research projects far beyond making advanced equipment available and providing routine services: this participation usually entails direct engagement in the projects, including offering advice, reviewing scientific literature, adapting existing technology or developing new methodologies. This is reflected in the fact that members of the facilities often co-author research papers.

All core facilities are accessible to all research teams on campus, and open to external users. A brochure provides a description of the facilities and guidelines on how to construct projects with them. Reflections on the economic model of the platforms have been renewed.

- For internal users, the research team pays for consumables, maintenance and personnel costs. These fees contribute to covering the cost of the facilities, but never cover them fully.
- In collaboration with the Legal department, the TD has developed a legal framework to regulate third-party activity on the facilities and, together with the Finance department, has established rates for platform services for academic and non-academic external users. Depreciation costs – calculated over 5 years – are included in these rates. Fees for private companies are higher than for academic users and are negotiated on a case-by-case basis by the Research applications and industrial relations department (*DARRI: département des applications de la recherche et des relations industrielles*).

The TD is responsible for implementing a multi-year investment strategy. To ensure medium-term visibility, each facility builds a strategic plan over 3 to 5 years specifying the equipment they wish to acquire, necessary installation work, personnel, operating budget, and IT support needs. These plans are based on recommendations of the steering committee of each facility and on a bi-yearly mapping of the technology needs of the research teams, with a priority list drawn up by each scientific department. The TD has set up a technology committee to help prepare decisions and anticipate significant investments in future strategic equipment. The allocation of the budget is decided by a college of department heads, chaired by the head of the TD.

The assessment committee considers that the core facilities are a strong asset of the Institute, making a major contribution to its research and innovation activities and results, and to its attractiveness. It welcomes the dynamic steering and management of these facilities and the development of a complete training programme on technology platforms for PhD students, postdocs and researchers. It encourages the Institute to pursue its reflections on measuring their impact. The committee has also noticed that new platforms are created while existing platforms almost never close (each platform tries to evolve and provide new services); it welcomes the commitment of the Institut Pasteur to organize a complete evaluation of the core facilities by 2026. Lastly, the committee very much welcomes the current reflections about **joining forces with other institutions to promote the increased sharing and pooling of platforms and expertise**.

4 / Open science

The Institute has given considerable thought to the implementation of open science, in both areas of open access publication and data sharing. On its website, it offers a comprehensive section dedicated to open science, including several tools, guidelines, training resources and open reflections. It regularly measures its progress, and makes these indicators public in its 'open science barometer'.

According to this barometer, 91% of the publications published in 2022 were open access in December 2023, demonstrating the Institute's strong commitment to making scientific research freely accessible. This success is driven by robust incentives, as only open-access publications are recognized in the evaluation of individual scientists. The Institute now has to understand how to reach the 100% target in the coming years.

The *Institut Pasteur* is very committed to research data sharing, and has published a strong and structured policy statement on data management and sharing. In 2019 it introduced the use of data management plans (DMPs), which are increasingly becoming standard practice and progressively recognized as important for data sharing. The implementation of electronic lab notebooks is already in place or soon to be implemented as a critical building block for comprehensive DMPs. These tools are necessary to help streamline data management and sharing practices. The Institute provides support to its scientists and research teams in the elaboration of these DMPs and offers various training courses on data quality and management. An institutional 'Pasteur space' has been set up in the national *Recherche Data Gouv* repository to facilitate data sharing with the scientific community, and a dedicated tool has been developed for the secure sharing of multidisciplinary 'big data' with international partners. The Institute is also involved in promoting the transparency of clinical trials: the results of its clinical trials and studies are published in open-access registers on the NIH clinical trials web site.[11]

[11] See https://clinicaltrials.gov/.

Despite these remarkable efforts, several challenges remain. It is clear that the internal culture surrounding data still needs to progress. Furthermore, DMPs are not yet uniformly applied across the full spectrum of the Institute's research. **Further efforts are needed to standardize DMP usage across all research domains. The assessment committee also recommends actions to enhance DMP usage across the Pasteur network** (PN): the DMP mechanism should be used to ensure consistent and effective data sharing across PN institutions, which will further strengthen the network itself. A 'train the trainers' programme could be implemented to help encourage best practices and disseminate consistent application of DMPs across collaborative projects within the PN.

II. The *Institut Pasteur* in society

1 / Public health

f/ The Institute's public health activities

The *Institut Pasteur* carries out public health functions through its health surveillance and monitoring network, its medical centre, and disease prevention activities relying on its research activities and its external communication. It supports these functions through:

- research and discovery (biological basis of disease and its control, notably microbiology, genomics, immunology and infectious diseases);
- innovation and technology transfer (novel vaccine technologies, diagnostics, and therapeutics);
- health surveillance and monitoring, with 13 national reference centres (NRCs) and 7 World health organization collaborating centres (WHO-CC), and with its Laboratory for urgent response to biological threats;
- epidemiological investigations: mechanisms of disease transmission, host-pathogen interactions, risk factors, control strategies, mathematical modelling;
- education at PhD and master levels, as well as education of medical doctors, and epidemiology training;
- clinical services in infectious and tropical diseases, and in travel medicine at the *Institut Pasteur* medical centre, on the campus.[12]

The effectiveness of the Institute in supporting public health depends on collaborations with numerous other institutions in France. Three of these are:

- *Santé publique France* (*SpF*),[13] the French public health agency, which finances the *Institut Pasteur* to carry out services, in particular in the national reference centres (NRCs), but also for epidemiological analysis (notably mathematical modelling) and training.
    - The *Institut Pasteur* has obtained the accreditation of 13 NRCs[14] for the main infectious diseases, providing epidemiological monitoring and health expertise.[15] These 13 centres represent a third of all French NRCs, underlining the Institute's unique potential to play a major role in France's public health system.
- The *Assistance publique des hôpitaux de Paris* (*AP-HP*, the group of 38 public hospitals in the Paris area), a key partner in clinical research (see section III.1 below);
- *Inserm*, the national agency for health research, especially via the long-standing joint research units (*UMRs*). These collaborations span environmental health, toxicology, and the epidemiology and control of infectious diseases.

On a broader scale, the cooperative actions within the Pasteur network and its relations with the WHO are instrumental in helping the *Institut Pasteur* play an international role in public health. The Institute also has strong relations in the South with *ANRS-MIE* (*Agence nationale de recherche sur le sida et les hépatites virales - Maladies Infectieuses émergentes*), the research funding agency internal to *Inserm*.

Investigators specifically involved in activities addressing population health (e.g. epidemiology and modelling) make key contributions to the Institute's research and help ensure that its contributions to public health take place in a *continuum* from discovery science to health policy. Synergies between research and public health activities could be further developed by leveraging public health data – and clinical data – more effectively in research initiatives.

The assessment committee considers that the Institute's public health activities would benefit from strengthening its involvement in the networks of public health centres and laboratories in France and abroad. There seems, for example, to be little cooperation or exchanges between the Institute's NRCs and the other French NRCs. Also, **the committee recommends that the *Institut Pasteur* define more clearly its ambition and strategy in public health**. This would be a valuable guide for staff, collaborators, funders, political decision-makers and the public at large. Creating a direction in charge of implementing this strategy could be an appropriate way to ensure that this mission of the Institute receives proper visibility and momentum.

---

[12] It was agreed between the *Institut Pasteur* and *Hcéres* that this assessment would not cover the activities of the medical centre.

[13] *SpF* is one of France's public health agencies. It is primarily in charge of surveillance, monitoring epidemics and communicating to the general public. It does not have a health police or research remit, and it is not responsible for issuing authorizations for medicines, treatments or clinical trials.

[14] In addition to these 13 NRCs, the Institute also hosts 2 associated laboratories linked to 2 other NRCs. See https://www.legifrance.gouv.fr/loda/id/JORFTEXT000046849745/2024-11-25/.

[15] The NRCs are appointed by the ministry of health for 5 years, after a competitive call organized by *SpF*. About two thirds of the NRCs' activities at the *Institut Pasteur* are financed by *SpF* and one third by the Institute itself.

g/ The Institut Pasteur in the Covid-19 crisis

Obviously, the Covid-19 pandemic was a major event in the reference period of this assessment, and the committee's attention has been drawn to the *Institut Pasteur*'s actions and contributions in this crisis. A very brief summary of these actions and contributions is as follows:

- The Institute clearly had a very good pre-epidemic response. On 30 January 2020, six days after confirmation of the first three cases of patients affected by coronavirus in France, it sequenced the whole genome of the coronavirus (then known as '2019-nCoV'), becoming the first institution in Europe to sequence the virus since the start of the outbreak.[16] Another early contribution was the development of the first PCR tests in France.
- The Institute established a Covid-19 task force and initiated a specific internal call for research projects related to the virus and the epidemic as early as January 2020; 105 projects were proposed, and 98 of them were funded.
- After the pre-epidemic phase, the Institute met with difficulties in 'scaling up'; neither the *Institut Pasteur* nor any actor in any country was ready to face the challenge of monitoring a massive epidemic. Some specific difficulties concerned the sharing and opening up of data. However, several other key contributions for the management of the Covid-19 crisis in France came from the teams of the Institute, for instance on epidemic modelling, antibodies tests and large-scale genomic surveillance of SARS-COV-2. The Institute's involvement in advising the French government and in disseminating information to the general public is also to be noted.
- A detailed report on the results of the Institute's very strong mobilization during the Covid-19 crisis was established and presented to the BoD at the end of 2021, showing high performance in publications –– with a higher number of citations per publication than several world-class research institutions – and patent filings.

The SAR and appendices, as well as the documents presented to the BoD, essentially highlight the magnitude of the results of the Institute's mobilization during the crisis. However, the Institute also developed reflections on what could have been done better and what should be done to improve pandemic preparedness. The crisis revealed the weakness of the Institute's relations with hospitals, and with surveillance platforms. These post-crisis reflections are at the core of the Institute's projects for the coming years in terms of platform development for diagnostic innovation, pathogen discovery and surveillance, and strengthened hospital collaborations, in the context of the 'Pasteur pandemic preparedness initiative' (P3I). Also, some of the Institute's officers interviewed by the assessment committee highlighted that the Covid-19 crisis 'has shaken the Institute's culture, which was prioritizing basic science and needs to pay increased attention to delivering effective results for society as part of our missions on public health and innovation'. These reflections should be central to preparation of the Institute's next strategic plan.

h/ Vaccines

While the *Institut Pasteur* was recognized for substantial contributions in the Covid-19 pandemic, it was also heavily criticized in France for its 'failure to progress a SARS-COV-2 vaccine towards the market'.[17] The assessment committee welcomes that the Institute made a real analysis of this situation and gave it in the SAR:

- Relying on its work on measles-based vaccines against chikungunya, the Institute used the same strategy to develop a vaccine against SARS-CoV-2, financed by CEPI (Coalition for epidemic preparedness innovations) and co-developed with MSD (Merck Sharp and Dohme). Preclinical results were encouraging, but phase-1 trials of the vaccine candidate, launched in August 2020, showed insufficient immunogenicity and were stopped in January 2021.
- While insisting that it should not mask the results achieved by its teams during the Covid-19 crisis, nor its work on another intranasal lentiviral vaccine candidate, the Institute recognizes that this episode partly reflects its disengagement from vaccine research over the past ten years – with prominent scientists in the field having retired during this period and not having been replaced, which resulted in a limited critical mass and in particular in a lack of understanding of new vaccine technologies such as mRNA-based vaccination. Additionally, the Institute recognizes that there were insufficient organizational and project-management processes.

In the framework of the P3I, two flagship projects emerged from these learnings from the Covid-19 crisis:

- A new Centre for vaccinology and immunotherapy (CVI) is being established. This aims to take basic research to product development through clinical trials against infectious and non-communicable diseases, focusing on three disease categories: a) infectious diseases (Covid-19, influenza, dengue fever, tuberculosis, HIV, etc.), b) antibiotic-resistant microbes and c) cancer. The *Institut Pasteur* is

[16] This work was done by the NRC on respiratory infection viruses, using a platform of the *Institut Pasteur* that is available to all French NRCs.

[17] These words are taken from the SAR (Appendix 4).

working on this project with *AP-HP*, *Inserm* and *Université Paris Cité* (*UPC*), in the framework of the national *France-Vaccins* programme.
- Moreover, a Centre for research on vector-borne diseases (*CMTV*) has been launched and will also be beneficial for vaccine development in this area.

The assessment committee very much welcomes these two projects, in areas that are clear longstanding strengths of the *Institut Pasteur*. The CVI project, in particular, is a very ambitious project – with the highly ambitious objective of bringing three products (vaccines or immunotherapies) to market within six years;[18] it includes very difficult challenges in terms of financial resources to be mobilized, best-in-class talent to be hired and developed, and the ability to adapt the trajectory of the project to the resources available. **The committee considers that the development of translational research and the relations with industrial partners that will bring new products to market are crucial for the success of CVI and require further reflection.**

2 / Innovation and relations with companies

Innovation at the *Institut Pasteur* follows different paths, such as startup creation, technology transfer, contractual cooperation with large or medium-sized companies, etc. A strategy is built for each innovation by the Research applications and industrial relations department (*DARRI*), with the objective of maximizing the expected impact – and explicitly not with the objective of maximizing financial revenues for the Institute.

Thirty-five startup companies were created from the Institute between 1997 and 2023, with an average number of creations per year remaining close to 1.5, and no significant evolution in the past 15 years. Twenty-five of these companies are still active. The amount of funds raised by these companies is over €1,500 million, which is remarkable. Regular awareness-raising sessions on startup creation and training sessions on entrepreneurship are organized on campus, including a monthly 'startup breakfast'. The spinouts start with best science, and various models exist for their relations with the Institute (exclusive licence, contract agreements, etc.). In general, the principal investigator tends to stay within the Institute and provide advice or consultancy to the startup. Funders and CEOs (chief executive officers) work together with scientists and with *DARRI* to launch new companies. The Institute has the ability to use part of revenues from its equity as a seed capital fund, to invest in new startup companies.

Increasing the number and quality of industrial partnerships has been a priority of the Institute's 2019-2023 strategic plan. The assessment committee interviewed the CEOs of three recent startup companies created from the Institute. They all praised the high professional standards and 'pro-business' attitude of the *DARRI* teams, and they insisted that the work with the legal team was smooth, business-minded and efficient; one of them mentioned that a licencing agreement was executed in one month, which is impressively rapid. It is worth noting that one of the three startups is a software company, exemplifying the potential of the Institute to go beyond its usual biomedical expertise. All three CEOs acknowledge the reputation of the *Institut Pasteur* as a major asset for their companies.

The committee also interviewed officers from three large or medium-sized companies having a partnership with the Institute, namely Sanofi and two biotech companies. Sanofi is the largest partner with a framework agreement covering a dozen scientific sub-contracts in areas of mutual interest to the *Institut Pasteur* and to Sanofi;[19] in these collaborative programmes, Sanofi covers the full costs of the research carried out in the Pasteur teams, and intellectual property is shared 50-50 between the two partners. The biotech companies were also very positive about their partnership with the Institute and described good and frequent two-way interaction; one topic to consider for improvement is to capitalize on the Institute's reputation to facilitate fundraising for partner companies in the area of infectious diseases, where funding is difficult.

DARRI has a team of 40 to 45 people. The committee was impressed by its range of expertise, from the ability to discuss with scientists to marketing and business development, including legal protection, contract management and management of patent and technology portfolios. One team is also in charge of detecting scientific discoveries having a notable potential to become real innovations. *DARRI* has financial support available for funding development work (up to 2 years), from science to products, and it runs training programmes and workshop initiatives particularly targeted to PhDs and post-docs. *DARRI* sees its role as primarily to bring innovations into existence in order to improve human health – the financial benefits to the Institute are explicitly a secondary by-product. *DARRI* is a unique asset for the *Institut Pasteur*, from strategic thinking to implementation.

[18] Source: SAR.
[19] Up until 2022, the framework agreement was concluded between the *Institut Pasteur* and 'Sanofi Pasteur', a subsidiary of Sanofi. When the agreement was last renewed in 2022, both parties decided to avoid confusion liked to this 'shared' name; the former 'Sanofi Pasteur' company now bears the sole name of Sanofi.

In this very positive context, **the committee recommends that the Institute pursue its efforts to transform some of its discoveries into innovations and bring them efficiently to society**. The committee noticed, however, that the SAR expresses some concerns regarding the 'innovation culture' in the Institute's teams: it mentions 'rooting innovation in the Pasteur culture' and 'overcoming the opposition between basic research and innovation' as challenges for the future.[20] This is certainly an important topic to be addressed so that the Institute can fully realize its innovation potential for the benefit of human health. It would be good, here, to remember that the *continuum* from basic research to applications is a key asset in the legacy of Louis Pasteur.

3 / Training activities

As a research institution, the *Institut Pasteur* has a strong involvement in training PhD students, as well as master students. The Pasteur campus hosts around 300 master and 300 PhD students; approximately 90 theses are defended annually.[21] The *Institut Pasteur* has always encouraged its scientific staff to take part in university teaching activities, and the recent agreement with *Université Paris Cité* (*UPC*) is an opportunity to strengthen these activities. *Institut Pasteur* staff wishing to become more explicitly involved in *UPC*'s teaching teams may receive the title of '*professeur associé*'. In addition, the Institute participates in the management of UPC's doctoral schools, and all PhD students of the Pasteur research teams affiliated to one of these doctoral schools now have access to *UPC* courses.

Education is also, however, one of the four core missions of the Institute, which has developed an ambitious training programme *per se*, including a rich variety of courses and initiatives. The investments made in the last ten years do seem to translate into a solid, creative and comprehensive offer, in line with new technologies and uses of digital education. In relation to the Pasteur network (PN), the Institute provides 25 massive open online courses (MOOCs) intended for scientists, life-science students and health professionals, and freely available to all. Most of the Institute's teaching activities are done in partnership with French and international universities. The Institute is currently developing – together with a French business school – a new programme to train entrepreneurs at international level in innovation management in life sciences and health.

As said, the integration of the Institute within the PN represents a powerful opportunity for training and bilateral capacity-building at every level. Novel research projects and networks will be supported by these training experiences. South-south training opportunities within the PN should be encouraged. These perspectives will allow the *Institut Pasteur* to be an accepted partner in addressing the challenges to health at the global level.

The Training department and its comprehensive and flexible platform are paramount to developing training paths that can support new strategic areas, including collaborations with other leading institutions nationally and globally. **The committee encourages the Institute to pursue the promising developments of its teaching and training activities.** The creation of an alumni network could be an additional asset to give more visibility to the output of the comprehensive training portfolio.

The assessment committee wishes to emphasize that the mission of the *Institut Pasteur*, aiming at improving health outcomes at the individual, societal and global levels, requires the translation of cutting-edge discovery science in the training of clinicians. In partnership with the clinical networks, clinician-scientist programmes will have to be established and integrated into medical career paths to truly deliver the translation of discovery science into direct patient care.

4 / Sharing knowledge with society, and external communication

Science communication is a key activity for the *Institut Pasteur*. This is particularly true in today's environment of decreasing trust in science and in experts, and with the increasing role of social networks. A great deal of good work is underway: external communication appears robust, and the web site is visually appealing. The comments below are intended to encourage the continuation and strengthening of these efforts.

Sharing knowledge in an appealing and accessible format remains essential for the public image of the Institute and to maintain strong relationships and credibility with its public and philanthropic supporters. For successful communication beyond the publication of research results, researchers need to be enabled to connect with communication experts who ideally should also have a deep understanding of science: this can only be achieved through close and regular interactions between researchers and the Communication department to understand each other's needs. It is not clear to the assessment committee how much the communication activities stem from a top-down approach rather than from the Pasteur community at large; it would be interesting to encourage all scientists and employees to act as active participants and initiators of the communication activities. Also, the committee considers that participatory initiatives can add significant value

[20] Source: SAR.
[21] Source: SAR.

and should be embedded in the research process from the early stages to address societal questions and concerns about the research activities of the Institute.

The assessment committee could not ascertain whether the Institute's actions on communication include a thorough analysis of its 'targets'; for instance, to what extent patients' associations or younger generations in general are reached. The committee stresses the importance of the Institute carefully monitoring the evolution of how it is perceived by the public.[22]

The assessment committee recommends that outward-facing, open communication about the directions and priorities of the *Institut Pasteur*'s next strategic plan be developed to manage public expectations and raise interest in new developments. Strengthening the collaboration of the Pasteur museum with other Paris science museums could also be interesting to exploit a broader reach and deploy its full potential. Lastly, the committee suggests that the Institute's communication strategy could include the Pasteur network (PN) and offer visibility to the PN partners.

5 / Ethics and scientific integrity

The *Institut Pasteur* coordinates several ethical committees and has a long historical tradition of reflection on ethical questions. The committees cover a broad range of responsibilities, from general ethics guidance to specific questions related to clinical research or animal experimentation; their composition comprises both scientists and non-scientists. The main ethics committee audits staff members before forming general ethics opinions, and consults working groups involving key stakeholders on the campus. *Ad hoc* ethics committees are also set up whenever needed; for instance, a new 'dual-use liaison group' is in charge of mitigating risks linked to research with 'dual-use' potential, namely research that may cause broad negative consequences if intentionally or incidentally misused.

The Ethics unit – included in the Ethics, compliance, and health law division – operates the ethics committees and provides support and training. PhD students conducting their research at the *Institut Pasteur* receive compulsory training in scientific integrity and in research ethics. Formal ethics training is also compulsory for every person involved in animal research.

The Institute also pays very high attention to scientific integrity. It articulates general mechanisms on professional conduct (prevention of conflicts of interests, anti-corruption measures and whistle-blower procedures) with specific scientific integrity mechanisms (prevention and management of misconduct and appropriate handling of interpersonal conflicts). Extensive training and awareness initiatives are undertaken. There are events to disseminate information on research integrity among PhD students and principal investigators – every new PhD student receives training, and a survey is run among PhD students. A new charter for research integrity was drawn up in 2024, and a network of correspondents has been set up to 'bridge the gap' between the scientific integrity officer and the research teams. Up until now, the Institute has met very few situations of scientific misconducts. The assessment committee was surprised to note that there are very few relations with the Pasteur network on scientific integrity.[23]

The committee welcomes these efforts which sustain the Institute's strong policy on ethics and scientific integrity. It recommends ensuring that all new staff receive training. Also, it advises the Institute to check that it is fully prepared in the event it encounters a situation of serious scientific misconduct; the definition of an appropriate 'scale of sanctions' and the delicate issues of both internal and external communication in such an event deserve careful preparation.

[22] The SAR gives the results of a yearly survey on the reputation of several research institutions in France. It shows that the Institute is the best-known institution in the sample, and that almost all French people (95%) are aware of *the Institut Pasteur*. It also shows, however, that the percentage of very positive answers ('excellent' and 'very good') declined somewhat from 70% in 2018 to 60% in 2023.

[23] Source: interviews held during the assessment visit.

III. Position and partnerships

1 / Position and partnerships in France

The *Institut Pasteur* occupies a historic and visible place in the French public health system and research system, with an image that, for the general public, remains strongly linked to the development of vaccines. From the outset, its institutional positioning has been two-fold: on the one hand as a research and training organization, and on the other hand as a public health operator with a strong vaccine component in the field of vector-borne diseases. For a long time, partnerships with the universities were essentially limited to links with university hospital centres based in the Paris area, without involving the other university departments.

As a result of the national 'investment programmes for the future', a global partnership was established in 2021 with *Université Paris Cité* (*UPC*) – a multidisciplinary university, one of the biggest in Paris and the biggest French university in the field of health. The Institute and *UPC* have decided to integrate their governance, with cross-participation in their boards of directors. All scientific publications of the *Institut Pasteur*'s research units are now co-affiliated with *Université Paris Cité*, which has enabled the university to make significant progress in international rankings, and all their technological platforms in the health field have been networked. The *Institut Pasteur* has also brought into the alliance the 3 laboratories of excellence (Labex) which it had obtained on its own – Revive (Regenerative biology and medicine), IBEID (Integrative biology of emerging infectious diseases) and '*Milieu intérieur*' – with the intent that they join UPC and be renewed in 2025. Public health is not left out of this alliance, with the *Institut Pasteur* participating in two university hospital institutes (*IHU*) linked to *UPC*: Innovand and Re-connect.

A new structuring and promising partnership has therefore been set up over a short period of time. The interviews held during the assessment visit showed, however, that both partners have not yet defined a real common strategy, with clear shared objectives. Together with the partnership with Paris hospitals (*AP-HP*), *Institut Pasteur*'s partnership with *UPC* could be essential for implementing the translational agenda and the *continuum* from discovery to new products and treatments, offering clinical trial capacity and building effective training and clinician-scientist schemes. The partnership could also be essential for the development of cooperation between the research teams at the *Institut Pasteur* and the social sciences. **The assessment committee encourages the *Institut Pasteur* and *Université Paris Cité* to define an ambitious shared strategy, not only for the development of their activities in research, from basic to clinical research, but also in training, innovation and public health.**

The *Institut Pasteur* also has a long-standing partnership with the *Assistance publique des hôpitaux de Paris* (*AP-HP*). The framework agreement between the two institutions has been renewed every 5 years since 2009, and both institutions have seen the latest renewal in 2023 as an opportunity to give new momentum to their cooperation, with the shared objective of boosting translational research and bringing new benefits from research to patients. The framework agreement now includes more efficient mechanisms for co-financing clinical research, for data sharing and for career development for clinician-researchers. The assessment committee welcomes this evolution; **it recommends, as part of the *Institut Pasteur*'s strategic partnership with *UPC* and *AP-HP*, rolling out an ambitious programme of translational and clinical research, including training for medical doctors**.

The older partnerships with the national research organizations, mainly *CNRS* and *Inserm*, have continued under unchanged terms and conditions; around 100 of the 142 research teams of the *Institut Pasteur* are embedded in joint research laboratories (*UMRs*) with *CNRS* or *Inserm*.[24] There are also two joint research teams with *INRAE* and one with Inria.

The *Institut Pasteur* has therefore begun to adapt its partnerships to the rapidly changing context of French higher education and research, with the growing role of the large research-intensive universities. The Institute should, however, continue to reflect on how to clarify and reinforce its position both in the national 'research system' and in the national 'health system'. Its unique position as a private institution recognized as being of public interest gives it substantial advantages (flexibility, etc.), but also poses challenges regarding how to fully play its role in the deployment of government policies in the field of research and health. The committee has identified two main avenues for progress:

- The Institute would benefit from opening up even more to its academic and public health environment and **developing new partnerships on a few major public health priorities for which the contribution of research is critical**. It should also reflect on how it can best play a role **as a major player in the new national 'programme agency for health' led by Inserm** and pay full contribution to a number of major collaborative projects.

[24] Source: SAR, Appendix 4.

- **Establishing a strategic dialogue at the best possible institutional level with the ministry of health and the ministry of research** – and *Santé publique France* – **would also help clarify the Institute's position in the fields of research and health in France, and improve its capacity to contribute to the government policies in these fields**. This would also be useful to prepare for any future health crisis. The establishment of a five-year strategic contractual framework with the two ministries – instead of the present purely financial contract with the ministry of research alone – might be an appropriate way of defining these perspectives and giving the Institute a clearer position in the French system.

2 / European commitment

In its 2019-2023 strategic plan, the *Institut Pasteur* observed that its success rate in calls under the EU's Horizon 2020 programme had fallen significantly between 2014 and 2018, and stated that it would closely monitor its participation in the next programme, Horizon Europe. The Institute participated in 24 grants of the European research Council (ERC) over the 2018-2022 period – including 10 grants whose principal investigators were *CNRS* or *Inserm* researchers working in one of the research teams on the Pasteur campus.[25] These include 3 very competitive 'Synergy grants' won in 2022.[26] The Institute also encourages top senior scientists to apply for Advanced ERC grants, with limited success for the moment.[27] The success rate at ERC is above 17%, more than 3 points above France's average success rate at ERC. Moreover, the number of ERC grants won by the Institute grew significantly over the period, from 2 in 2018 to 10 in 2022. On a wider basis, the Institute participated in 88 European projects funded by the European commission in the 2018-2022 period, including 20 Marie Sklodowska-Curie actions (MSCA) and 44 collaborative projects, with high success rates: 33.3% for MSCA and 25.8% for collaborative projects.

One of the reasons for this success is the strengthened support provided by the *Institut Pasteur*'s grant office, in the grant writing and in the pre- and post-award phases. It is clear that the grant office aims to support '*Pasteurian* scientists' – be they employees of the *Institut Pasteur* or researchers employed by other institutions and involved in research teams on the Pasteur campus – above and beyond typical project support and implementation. This very professional support, which is not limited to European projects, should certainly be pursued.[28]

The *Institut Pasteur* coordinates only 6 collaborative European projects. Amongst them is the flagship project Durable, the network of research laboratories and public health centres installed by HERA, the Health emergency preparedness and response authority created by the EU in 2021. The coordination of Durable showcases the Institute's European presence, but the committee noted that while Durable is well advertised in its communications, it seems to be less integrated within its strategic plans and activities; in fact, it does not appear to be recognized even within the French community itself.

The assessment committee sees the limited involvement of the Institute in the coordination of European collaborative projects as a clear sign: while the *Institut Pasteur* is undoubtedly a key player in France and abroad via the Pasteur network, its leadership position in Europe is somewhat muted. Interviews with several of the Institute's officers confirmed, indeed, that the *Institut Pasteur* has not articulated a clear strategy to assert its European leadership in some key areas where it should be a reference point, such as infectious diseases, crucial for future European pandemic preparedness. Leadership also entails the generosity to orchestrate scientific collaborations among various European players towards a unified goal. The *Institut Pasteur* has the history, stature, and unique qualities to assume this role, and it would be a loss for Europe not to leverage its potential in this capacity.

The committee recommends that the *Institut Pasteur* build an ambitious strategy to act as a leading player in the field of health in Europe. Developing this ambition will require the promotion of an internal culture that increases collaborations among scientists, managers, communicators and administrative staff to foster enduring internal and external collaborations, networking activities and coordination of European networks and projects. The Institute should strengthen its efforts to 'raise its voice' in Brussels, and also align its scientific policy with EU defined priorities to lead Europe in the fight against infectious diseases. It should also adopt a clear method for measuring its own achievements against other players in the European research area, for instance by formulating clear and consistent performance indicators.

3 / The Pasteur network and international partnerships

i/ The Pasteur network

The goal of this review was to assess the strategic role and potential of the *Institut Pasteur* as part of the Pasteur network (PN), not to evaluate the PN itself.

[25] Source: SAR.
[26] Source: SAR.
[27] Source: interviews held during the assessment visit.
[28] The grant office has three divisions: national, EU, international. It includes 23 people.

The PN is a major asset which, as a worldwide platform for cooperation, has under-exploited potential. The PN consists of 31 member institutions in 24 countries. These institutions are spread across Africa (9), the Americas (4), Asia (8), Europe outside France (5) and France (5, in Paris, Lille and overseas). Together, these institutions include 19 WHO collaborating centres and 4 members of the WHO Covid-19 reference laboratory network. Through reforms in 2021, the PN has attempted to change its mode of operation – now working through a multilateral approach in which projects are co-designed by partners (a true network), rather than through multiple bilateral relations between the *Institut Pasteur* in Paris and PN members (the traditional 'spoke and hub' model). A new international scientific strategy was also defined in 2021, accompanied by the reform of the Pasteur network and its new approach to international multilateral cooperation.

The governance of the PN has been restructured to facilitate this change: the PN is now led by a president, a vice-president – who, according to the new PN bylaws, is the general director of the *Institut Pasteur* in Paris – and an executive director, guided by a globally representative advisory Board. The Institute is now positioned as one member of the network, remaining a key player, but no longer the leader or dominant player (in intent, at least). Indeed, PN members want to be more independent and less reliant on Paris. The PN president (also director of the *Institut Pasteur* in Dakar) aims to structure the PN on a regional level, appointing coordinators for Africa, Asia and Latin America. Recently, for the first time, PN members have created a joint international unit without Paris – between Senegal, Madagascar and Cambodia.

The PN has unrivalled reach in the francophone world (Caribbean, Sub-Saharan Africa and Southeast Asia). Links valuably extend other largely anglophone public health networks (e.g. WHO-CCs), but carry the risk of operating as French bilateral relations, whether real or perceived. The shock of the Covid-19 pandemic, especially the inequitable allocation of resources worldwide, has underlined the PN's role in strengthening independent research capacities, and in making a commitment to public health in the Global South.

The new PN is a real asset for the *Institut Pasteur* in Paris, giving the Institute a unique opportunity to reinforce its role in research and public health worldwide – even if it is no longer the network leader. It still has a singular role in terms of funding the PN institutions and actions, for an amount of €18 million in 2023, half of which coming from the French ministry of research and ministry of foreign affairs.[29]

The assessment committee considers that **the Institute should continue to establish its new role in the reconfigured PN, exploiting the power of the network to achieve more in research and public health worldwide** – even if regional networks become more independent from Paris. **Top priorities for the *Institut Pasteur* within the PN should include: help conceive and implement programmes with high impact for public health, strengthen research capacities, and foster staff mobility across the network.** The *Institut Pasteur* should also clearly communicate on the new configuration and strategy of the PN, in order to avoid erroneous expectations from French partners or French authorities, and promote its potential for collaborations in all regions of the world. The Institute could also explore the possibility of opening up the Pasteur network to project-based collaboration with other French academic institutions.

Lastly, the *Institut Pasteur* in Paris should pay very close attention to the 'reputational risk' associated with the PN – 25 members of which bear the name '*Institut Pasteur*', in various geopolitical contexts. In this regard, the assessment committee notes that the former 'Pasteur Institute in Shanghai' left the PN in 2023 and changed its name to the 'Shanghai Institute of immunology and infection of the Chinese Academy of sciences'. The assessment committee recommends that the Institute contribute to strongly reinforcing actions aimed at improving the involvement and attention of the PN's member institutions on key topics such as scientific integrity, reflections on research ethics and transparency, sharing of research data, etc.

j/ Other international partnerships

Beyond the PN, the committee has also examined the relationship of the *Institut Pasteur* with some key international partners.

The *Institut Pasteur* is a valued partner of the World Health Organization (WHO). 7 WHO collaborating centres (WHO-CCs) are located at the Institute, each focusing on a specific group of pathogens (but with no funding from the WHO). The Institute also hosts 1 collaborating centre of the World organization for animal health (WOAH) on emerging zoonotic pathogens. Moreover, 19 WHO-CCs are linked to the Pasteur network worldwide; these support national public health agencies and, in some countries with limited resources, carry out most of the essential public health functions. These collaborations with the WHO should be maintained and potentially extended, not as a source of funds, but as opportunities for collaboration worldwide, to amplify the benefits of the research conducted by the Institute and the PN for global health, and because they certify their excellence.

[29] Source: written answer of the *Institut Pasteur* to a written question of the assessment committee.

Another sign of the *Institut Pasteur*'s high visibility on the global scale is its participation in projects funded by major international players. Between 2018 and 2022, the Institute participated in 68 such international projects. Among their major funders are the National institutes of health (NIH) in the USA, the Bill and Melinda Gates Foundation (BMGF), DARPA (Defense advanced research projects agency) and the Wellcome Trust.

IV. Governance, organization, management and operations

1 / Governance

The governance of the *Institut Pasteur* is structured around a singular organization based on three components: the Board of directors (BoD) with a non-executive chairman, the 'Assembly of 100' which is essentially the emanation of the internal and external stakeholders, and the general management. A balanced relationship between these three components is an essential condition for the smooth running of the Institute's governance. This has not always been the case, since the Institute experienced two governance crises in 2004-2005 and in 2016: over and above the ups and downs that may explain them, these events represent a risk for an institution that relies on the generosity of the public, by calling into question its image and reputation in the eyes of potential donors.

- The BoD includes 22 members, 16 of whom are external to the Institute. The BoD rules on the strategic orientations presented by the general director; it votes on budgets and their amendments, and it accepts donations and legacies; it adopts the annual report and the internal regulations, and submits them to the Assembly for approval; it appoints the general director, the directors and the scientific department directors. The Board meets four times a year and it is supported by a 5-member Office of the Board and two internal committees, one responsible for audit and finance, the other for appointments and compensation. The BoD members interviewed by the assessment committee praised the quality of the interactions and debates within the Board, as well as the dialogue with the general director; they consider the Board to be in a position to exercise its responsibilities.
- The general director has operational power over a large number of subjects. As such, she exercises her authority over a large number of departments and directions, which she is responsible for coordinating and steering on a daily basis. She is responsible for the completeness and quality of the information provided to the BoD, and she regularly reports on the delegations that the Board entrusts to her.
- The 'Assembly of 100', which has existed since the creation of the Institute, is the most singular feature of the governance of the *Institut Pasteur*. It has the dual role of electing the members of the BoD and voting on the BoD's annual report, a negative vote leading to the BoD's resignation. It therefore exercises *de facto* control over the BoD. This unique and historic body sees itself as the custodian and guardian of the Institute's culture and values; it considers that its decision to dissolve the Board, taken twice in the last 20 years, did not cause a governance crisis, but made it possible to solve an internal crisis.

The assessment committee stresses that the development of regular and informal dialogue between the chairman of the Board, the general director and the Assembly, and the improvement of the quality of the information shared with the Assembly, are essential for fostering a climate of trust and reducing the risk of future governance crises.

The *Institut Pasteur* also has a Scientific Council (SC) and a Scientific advisory board (SAB).

- The SC is a statutory body. It has 16 members, including 10 scientific personalities not working at the *Institut Pasteur*; in the current composition, these 10 members work outside France, whereas the chair and vice-chair are *pasteurians*. The SC meets at least four times a year, with two-day meetings held in English. Its main role concerns the assessment of the Institute's research teams for their creation, renewal or closure; it reviews 10 to 12 research teams at each of its meetings; its recommendations are almost always followed by the BoD – which is in charge of the decisions at the end of the assessment process.[30]
- The SAB, a more informal body, is in charge of advising the general director. It currently has 8 members, appointed by the general director – all non *pasteurians*, and all but one working outside France. It holds a two-day meeting every other year.

The assessment committee considers that the Institute could benefit more from the involvement of members of both the SC and SAB; it noted in particular that the SC does not participate either in reflections on elaborating the Institute's strategic plan, or in the preparation of decisions about issuing calls for opening new research teams.[31] **The committee suggests involving the SC and SAB more in open reflections with the general director and the BoD.**

The Audit and internal control department (*AICD*) was created in 2019. It reports to both the deputy general director and the chairman of the BoD (in practice, to the audit and finance committee of the BoD). The *AICD* has built a 'mapping of risks', as well as a 3-year audit plan; 10 audits have been carried out, for instance on project management, on crisis management, on the purchasing process, on the 'biobanking strategy', and on

[30] Source: interviews held during the assessment visit.
[31] Source: interviews held during the assessment visit.

the general management's dashboard. The *AICD*'s vision of the hierarchy of risks for the Institute includes 1) the risk regarding corporate reputation and image (that does not give rise to audits), 2) cyber-risks and 3) capability to launch and manage big projects. The assessment committee notes that it did not get a clear description on all aspects of how the *Institut Pasteur* manages the reputational risk. It welcomes the creation of *AICD* and the increased attention paid by the Institute to risk management. It recommends stepping up actions aimed at disseminating a risk management culture among senior and middle management, and at monitoring the implementation of the audit recommendations.

2 / Organization and management

The organization of the *Institut Pasteur* appears to be complex. It is very articulated, and to some extent fragmented into 17 departments that have numerous interactions through multiple internal committees. The heads of divisions and departments meet in three different configurations under the responsibility of the general director: the Executive committee (7 members), the Management committee (20 members), and the Scientific management committee (8 members).

This high number of internal entities is in part related to the substantial effort made in the 2019-2023 period to strengthen research support, and the committee considers that the Institute's research teams enjoy a remarkable level of support in many aspects. Also, two new departments were created by the new general director in the first half of 2024, one on 'equality, diversity and inclusion', and the other on 'transformation and strategic projects'. The fact remains, however, that the information provided to the committee does not allow a clear understanding of the Institute's organization, nor of the key responsibilities and decision-making processes. This complexity begs for simplification and clarification.

The scientific organization is also complex, with 142 research teams, 12 scientific departments and 4 technological centres hosting more than 30 platforms. In addition, there are around 20 joint research units (*UMRs*) which operate in collaboration with French research partners (*CNRS*, Inserm, *INRAE* and *UPC*); the form of these internal and external structures could be reconsidered and simplified as much as possible.

Resource allocation appears to be a sub-optimal and under-used management tool. Heads of scientific departments are not in charge of the allocation of budget resources to the research teams, nor of managerial or HR (human resources) issues[32]. As a consequence, the 142 research teams directly interact with the 'central' administrative divisions about financial and HR issues, which results in a very centralized operation. Another observation of the committee is that it is quite difficult to understand which internal entities within the Institute – if any – have (yearly or multiannual) objectives concerning their contribution to the Institute's income. Lastly, it is difficult to understand who does what within the Institute concerning the monitoring of the activities. It seems that, apart from some exceptions, performance indicators are not routinely used and the dashboard of the general management is still under construction.

As a result, the *Institut Pasteur* has a limited ability to implement its strategy: there is little objective setting and monitoring and little relationship between resource allocation and strategy. Notwithstanding the benefits from the organization into small research teams with a high degree of autonomy – which in itself is likely to provide agility and reactivity at team level – the committee considers that real progress is needed at the scale of the Institute. Its recommendations are as follows:

- **To improve overall management, all deputy general directors, directors, department heads and scientific department heads should receive from the general director a multi-year mission statement** setting out their contribution to the implementation of the Institute's missions and strategy, and including yearly objectives whenever appropriate.
- **The budget should be linked to the strategy within a unified, transparent, decentralized process for monitoring and resource allocation, matching objectives with resources. Organization should be simplified at all levels to improve efficiency and enhance the monitoring of the Institute's strategy, objectives and resources.** A small number of high-level indicators should be developed to track progress against the Institute's main goals and targets.
- **Scientists and staff representatives should be more closely involved in elaborating and implementing the Institute's strategy, in setting priorities and objectives, and in decision-making at decentralized level and at the level of the Institute.**

The committee is convinced that progress along this path will foster a greater sense of collective ownership of the *Institut Pasteur*'s work and mission. It will also improve the quality and reactivity of its management, and its efficiency in using its resources.

[32] Heads of the scientific department have a role of 'scientific animation', and are involved in reflections on the Institute's internal incentive schemes operated under the aegis of the deputy general director for science. In the *Institut Pasteur*'s culture, where every research team enjoys a high level of autonomy and freedom, it is not even clear if anyone is in charge of the coordination of these teams, either at department level or at a higher level in the Institute.

3 / Human resources

k/ The workforce and its main evolutions

The SAR gives a detailed description of the *Institut Pasteur*'s workforce and its main evolutions in recent years. Between 2018 and 2022, the total number of employees increased from 2,206 to 2,388 (+8.3%), with contrasting evolutions:

- among the permanent staff, the number of researchers decreased from 312 to 292 (-20), the number of engineers grew from 257 to 314 (+57) and the number of administrative and technical staff increased from 657 to 725 (+68);
- among the non-permanent staff, the number of doctoral researchers grew from 148 to 188 (+40) and the number of engineers grew from 39 to 88 (+49).[33]

These figures illustrate the Institute's strong ability to make definite choices in its recruitment policy, and to change the balances within its workforce: in the reference period of the assessment, the priorities were to develop the pool of technology platforms and appropriately staff them, to strengthen administrative support services, and to increase the number of PhD students.

The 2019-2023 strategic plan highlighted that the Institute faces a major challenge related to numerous retirements among its permanent employees.[34] Moreover, it seems that the proportion of retirements is particularly high among the leaders of research units: 32% of them are over the age of 60.[35] Even though the loss of knowledge due to retirements of prominent scientists having not been replaced has been identified as one of the key factors explaining the difficulties encountered regarding vaccines (see section II.1.c), the assessment committee does not consider that the Institute has fully taken into account the scale of this challenge – which is exacerbated by the difficulties in attracting senior scientists (see next section). **There is an urgent need to set up a precise action plan to address the high number of retirements in the coming years, including specific succession plans for the most critical situations**.

Mobility of the Institute's employees mainly concerns the internal mobility of researchers and engineers between research teams. On average, around 25 researchers move from one research team to another every year; these moves are approved by the Scientific management committee. There is less internal mobility for engineers than for researchers. Apart from the Pasteur network (about 25 researchers and engineers work in another partner institution in the PN), the external mobility of researchers and engineers is very low and is essentially limited to the academic world: on average, there are about 5 moves per year for scientific stays in other research institutions. The Institute could encourage more external mobility, to give talented individuals the opportunity to gain new knowledge and methods by spending time in other laboratories.

l/ Attracting and retaining talents

Attracting top-level scientists is key for the *Institut Pasteur*. According to the SAR, the Institute considers that it is in a good position to attract promising young scientists, but it recognizes that it is less attractive 'when it comes to recruiting mid-level and senior scientists, as the requirements are more difficult to meet (space and salaries)'.[36] The SAR also shows that the Institute made a detailed analysis of the failures of some of its calls for recruiting leaders of new research units, and notes that the critical points were the proposed size of the unit (10-12 people maximum), the proposed salary and the package, often considered insufficient. **The assessment committee encourages the Institute to pursue its reflections on these issues, and to maintain its ambition to recruit world-class scientists, even if only in small numbers.**

In addition to recruiting permanent scientists to head a new research team, the *Institut Pasteur* also has a separate process to hire permanent scientists to join an existing research team. The lack of openness of this recruitment process was mentioned in section I.1.b above, and the assessment committee was told that this situation is widely known in the scientific community. The committee strongly recommends **moving towards a truly open recruitment process**.

The assessment committee received very little information about other recruitments; its understanding is that, unlike many public research institutions in France, the Institute has no great difficulty in attracting high-level engineers and administrative staff. Even if this is true, it would still be useful to reflect on how to retain these highly-talented staff and give them proper perspectives.

[33] Source: SAR, Appendix 1.
[34] The estimated numbers of retirements given in the strategic plan are as follows: 16% of the permanent workforce within 5 years (2019-2023) and 34% within 10 years (2019-2028). Source: SAR, Appendix 2.
[35] Source: written answer of the *Institut Pasteur* to a written question of the assessment committee
[36] Source: SAR.

m/ Taking care of talents

The Institute has developed a remarkable set of actions to support the professional development of young scientists, with a broad and ambitious view of helping them 'leverage all skills and aspirations beyond traditional paths'.[37] It created the Care service, dedicated exclusively to young scientists, to provide tools, give career guidance and organize different career events; the Care service has created a post-doc office, and developed partnerships with private companies to broaden young scientists' career perspectives. Beyond the actions of the Care service, the Institute develops several initiatives proposed to young scientists such as start-up breakfasts, technology transfer workshops and innovation training; it encourages participation by junior scientists in managerial courses and leadership courses, and it involves young employees in decision-making processes.

The Institute has also developed in-depth reflections on skills development for all its staff, on the basis of interviews and workshops involving a large number of employees, researchers, engineers, technicians and administrative staff. This work has highlighted some critical issues, such as accelerating data-driven science, strengthening interdisciplinarity and collaboration, facilitating the exploitation of research and reinforcing scientific communication. A broad and ambitious training offer has been established for all professions within the Institute.[38] The Institute is also considering the introduction of team reviews to strengthen the identification of talent and future leaders.

The *Institut Pasteur* is well aware that its employees need to benefit from a work-life balance. It uses indicators on the quality of life at work, and adopts measures to identify problems. Surveys on mental health are conducted on a yearly basis for PhD and post-doc populations. A digital platform will be launched in 2025 where personnel can report harassment and other problems, anonymously if they wish. After a poll including about 100 questions in April 2024, inappropriate behaviour came up as an issue that needs to be addressed: the Institute is working on this issue and aims to conduct a survey once a year. The Institute has realized that there is a certain lack of managerial culture and is working on developing this through training courses, and on building a mentorship programme.

The assessment committee welcomes the quality of the implementation of the *Institut Pasteur*'s HR policy, and its recognition at the European level. The Institute obtained the HR excellence in research award in 2021 and the HRS4R label from the European commission.

n/ Equality, diversity and inclusion

A gender equality plan was launched in 2022. The Institute strives for gender balance and equality, which should be integrated into the recruitment and promotion processes, but efforts certainly need to be strengthened. The Board of directors, the Executive committee, the Management committee and the Scientific management committee should actively increase their representation of women; the same is true for the Scientific staff evaluation committee (*Comesp*). Women are also underrepresented in scientific teams: among research associates 45% are women, among research directors 28% are women and among unit heads 25% are women. The good news is that equality was reached in the recruitment of new unit leaders over the 2018-2022 period (16 women and 15 men).

The EDI (equality, diversity and inclusion) department was set up in spring 2024 on the initiative of the new general director, with the motivation to underline the importance of the subject and take proper action for change; the new department has close interaction with HR department and the Corporate social responsibility department. An EDI action plan was presented to the Management committee in June 2024. **The committee recommends resolutely strengthening efforts on EDI, which is a major factor of attractiveness for the young generation of scientists.**

o/ Staff evaluations

The assessment committee finds that the individual evaluations of researchers and engineers are unduly burdensome. Every year, the Department of scientific careers and assessment (*DCES : direction des carrières et de l'évaluation scientifique*) and the HR department conduct a 'positioning study' for each researcher and engineer. The Scientific staff evaluation committee (*Comesp*) evaluates researchers and engineers every two years; the evaluation has no specific consequence but provides advices on individual career paths and signals possible problems. The committee suggests that the Institute examine the real added value of these evaluations – for the Institute and for the individuals – and investigate how they can be simplified.

Another observation of the committee is that the proportion of researchers and engineers among members of the *Comesp* seems imbalanced in comparison with the same proportion in the Institute's staff. Obviously, the

[37] Source: SAR.
[38] Source: SAR.

Institute has engaged in a transition whereby the number of engineers has increased – whereas the number of researchers has not – and where the involvement of engineers in research is changing because of the growing use of technology platforms and the growing need to develop data-driven science. The Institute should reflect on how its evaluation of engineers, as well as the composition of the *Comesp*, should evolve in this perspective.

Lastly, the assessment committee wishes to raise the question of whether the individual evaluation of researchers and engineers recognizes and appropriately values all their contributions to the missions of the *Institut Pasteur*. The Institute pays attention to this question. It recognizes that there was certainly a bias in the evaluations a few years ago in favour of researchers with the best-appreciated scientific contributions, but it considers that the evaluation has changed and now recognizes the full range of activities.[39] On the basis of what it heard during the assessment visit, the committee recommends continuing to pay very close attention to this topic: the Institute's culture and its very strong attachment to basic research raises the risk of its evaluation process giving greater recognition to basic science than to public health activities, training activities or applications of research. **To reach its full potential, the Institute needs to fully recognize all activities and contributions to its four missions**.

4 / Financial sustainability

Financial sustainability is a well-identified issue for the *Institut Pasteur*. Priority 4 of the 2019-2023 Strategic plan is devoted to this topic and lists 6 main objectives: a) boost industry partnerships, b) capitalize on the institutional brand to foster public generosity, c) encourage success in calls for projects, d) optimize expenses, e) guarantee good resources management and f) use advocacy initiatives to boost research funding. The SAR records that many actions have taken place: capital campaign with major donors, creation of the Philanthropy department, new policy for managing financial assets, work for renewing the patent portfolio (in the context of a fall in patent royalties following the expiry of most of the Institute's patents), etc. Moreover, the BoD – and its committee for audit and finance – monitors the financial situation carefully.[40]

The Institute has essentially three types of operating revenues:

- public subsidies from the French State (about 22% in 2023);
- generated income, comprising industrial revenues, revenues from research contracts and revenues from 'sales and services' stemming from diagnostics, vaccines, therapeutic treatments, etc. (about 44%);
- public generosity, *i.e*. donations and sponsorship (about 30%).[41]

Total revenues increased in the 2018-2023 period, from €261 million to €288 million. The three types of revenues have quite contrasting evolutions: the government's subsidy is almost flat in absolute value, which means that the relative contribution from the French State is decreasing; generated income has been growing, from €104 million to €126 million; and revenues from public generosity have grown from €83 million to €89 million – plus a one-off increase of more than €30 million related to the Covid-19 crisis.

A major particularity of the Institute's operating account is its net operating income, which is structurally in deficit. Every year in the 2018-2023 period, operating expenses exceeded operating income, and the balance of the general annual account is obtained through an *ad hoc* mobilization of financial and asset revenues. Under the Institute's rules, financial donations above €300,000 must be recorded as part of the Institute's equity, but the BoD may decide to record some of these donations as 'exceptional revenues' to balance the annual operating accounts. Therefore, the *Institut Pasteur*'s equity constitutes its 'all-risk insurance' over the long term. This equity consists of financial assets and real estate. Its level and its regular renewal should enable the Institute to regulate all variations in income and expenditure that may occur. This equity amounts to €1.1 billion, an exceptional level in France and a favourable situation for the sustainability of the Institute's economic model. This equity value has been growing steadily in recent years.

Apart from resources, financial sustainability also depends on controlling operating costs. The assessment committee observes that this issue deserves particular attention. The objective set in the 2019-2023 Strategic plan, namely to 'bend the spending curve after a considerable development phase between 2014 and 2018' has not been met. In the 2019-2023 period, operating expenses grew faster than in the 2014-2018 period, from €291 million to €353 million (+21%);[42] the growth of personnel expenses, from €151 million to €179 million (+19%), is due to both increased headcount (+8%) and salary increases. Part of this growth is due to external factors

[39] Source: written answer of the *Institut Pasteur* to a written question of the assessment committee. This answer stresses that the evaluation criteria now include compliance with integrity and ethics rules, openness of research, collaborations, qualitative rather than quantitative assessment, impact of basic as well as applied research, involvement in training, mentoring and service to the institution, and leadership. At the same time, the Institute recognizes that current evolutions in its research, in particular data-driven research, make it necessary to adapt scientific evaluation. Source: SAR.
[40] Source: written answer of the *Institut Pasteur* to a written question of the assessment committee.
[41] Source: SAR, Appendix 3.
[42] Source: SAR, Appendix 3.

(especially in 2022 and 2023: inflation, energy costs, etc.), but part of it is due to choices made by the Institute. **The Institute should improve its budgetary management, both for forecasting expenses and monitoring them, at annual and multiannual levels.**

Besides operating expenses, capital expenditure will be a key aspect of the economic sustainability of the Institute in the coming years, be it only for the ambitious projects of the *CMTV* and the CVI. However, the assessment committee was unable to examine this component of the Institute's financial forecasts in detail (they include assumptions about the evolution of interest rates on the financial markets that the committee did not have the necessary skills to analyse). A key question concerns the risk analysis for these major projects, and the Institute's ability, if necessary, to adapt or not the projects to actual budgetary possibilities.

To strengthen the financial sustainability of its economic model, the Institute could activate several levers. It should clearly **pursue its efforts to increase the collection of donations**. It has also taken actions to increase its industrial revenues, to renew its patent portfolio and its 'public health services'. These actions should also be continued and might, in the mid- to long-term, make a significant contribution to increasing the Institute's revenues; this should not, however, be done at the expense of its innovation strategy (see section II.2 above), which seeks as a priority to maximize expected impact for society and not to maximize the Institute's revenues obtained from innovation and transfer.

Another key topic is related to increasing revenues from research contracts. This is a delicate question as most of the resources from project funding are allocated directly to carrying out projects and cannot always cover indirect costs.[43] **The Institute should consider setting up an action plan aiming at mastering the economic model of its contractual research activities**. This is a difficult challenge which involves many sensitive aspects, such as:

- improving the management of contractual activity, in terms of choosing the projects to be set up in line with the scientific strategy, choosing – whenever possible – funders who cover full costs, and managing the projects up until delivery of the expected results and invoicing of the expected turnover;
- deploying management tools (analytical cost accounting systems) making it possible to calculate the full costs and expected margin of each project and monitor its execution in direct relation with the research teams.

Engaging in this direction is certainly a big change for the *Institut Pasteur*. It requires strengthening the support provided to the research teams, and a move towards a 'culture of improving resources'. This perspective is key, however, for allowing the Institute to reinforce its economic model and to achieve convergence between the objectives and resources policies.

Finally, the sustainability of the *Institut Pasteur*'s economic model also depends on enhancing its brand and promoting the benefits of its activities for society. Given the decisive role played by resources from public generosity in its financial balance, the need for an exemplary image and exemplarity in all its operations is paramount. This 'reputational risk' has a highly strategic dimension. As mentioned in section II.5 above, the assessment committee welcomes all the efforts made by the Institute in this area, particularly in terms of ethics, transparency and scientific integrity. It encourages the Institute to play a leading role, with other French and European research players, in developing reflections and actions aimed at improving society's trust in science, and it urges all members of the *Institut Pasteur* to pay the utmost attention to preserving and improving the Institute's reputation.

5 / Environmental impact

The *Institut Pasteur* has chosen to commit itself over the last few years to achieving a substantial reduction in the carbon, energy and environmental footprint of its activities, and has taken a number of actions. A sustainable mobility plan was put in place for 2020-2023; it is due to be renewed shortly. In November 2022, the Institute joined the 'Paris climate-biodiversity action plan' and set up a 'Green campus' action plan – which is also due to be updated by the end of 2024. This action plan was preceded in January 2022 by a document summarizing the actions carried out by the 12 scientific departments in connection with the implementation of the 17 United Nations Millennium sustainable development goals. A 'GreenTeam employee resource group' was set up in 2023, made up of 50 volunteers, to promote actions aimed at raising awareness of sustainable development among all employees. 2024 also saw the production of the Institute's first greenhouse gas balance sheet, together with an action plan to reduce the carbon footprint of its activities.

The Institute could further amplify its action on these issues and give them greater visibility and strategic coherence. To this end, the theme of sustainable development in its broadest definition could be one of the

[43] The Institute's officers interviewed by the assessment committee consider that, on average, the indirect costs of the Institute's research projects amount to 22% of direct costs; the overhead received from the funding agency often covers only half of these indirect costs.

major thrusts of the Institute's new strategic plan, including two aspects in particular: on the one hand, greater visibility could be given to research activities and results on the theme of 'climate change and public health', highlighting the competitive advantages of both the Institute and the Pasteur network on vector-borne diseases as part of a 'one health' approach; on the other hand, at the level of the Institute's operation, the *Institut Pasteur* could produce a global master plan based on a participatory approach. This would give greater coherence and strength in its ability to mobilize employees around these major issues for the future and reinforce the Institute's reputation as an exemplary institution.

Conclusion

With a rich history and significant contributions to major scientific discoveries in human health, the *Institut Pasteur* stands as one of France's leading international research institutions. Known for its excellence in research on vector-borne diseases and infectious diseases, its reputation has been slightly tarnished by the – not fully justified – criticism of not succeeding to develop a Covid-19 vaccine and bring it to the market. However, the foundation of its scientific excellence remains strong. The recently appointed general director is well placed to develop and lead the implementation of a new strategy that will further strengthen the Institute as an international centre of research excellence. In addition to its firm commitment to contributing to world-class discoveries in health sciences, the Institute could engage in enhancing its impact in society, whether through developing innovations, contributing to public health and training targeted audiences, and communicate this overall impact.

The *Institut Pasteur*, as a private foundation, enjoys a unique position in the national human health research ecosystem. This allows it greater responsiveness and flexibility compared to public institutions. However, this unique position can also pose challenges when it comes to fulfilling its role in the deployment of government policies in the fields of research and health. Strengthening partnerships is likely to be beneficial in many areas. The open, external-facing approach is likely to be beneficial, as evidenced by its recent partnership with *Université Paris Cité*. This open approach should be further developed to support its strategic goals.

At the European level, the *Institut Pasteur* could enhance its visibility and commitment to major strategic initiatives by building solid institutional partnerships. Efforts to secure more ERC grants should continue, and the Institute should aim to coordinate key projects to raise its profile as a leader in Europe.

The Pasteur network is a global platform for international scientific partnerships, offering significant benefits due to its extensive geographical coverage and the quality of its member institutions, which share common scientific themes and values. This network allows the *Institut Pasteur* to project its scientific strategy internationally in research and public health projects across diverse health contexts. The network reforms initiated in 2021 should continue to enhance resource pooling among members, focusing on regional dimensions and project-based researcher mobility. Expanding the network to include other French and European academic partners could also be considered.

The Institute's governance model, featuring an Assembly of representatives with significant decision-making powers, has proven effective. This body can dissolve the Board of directors by rejecting its annual report, a power used during institutional crises in 2004-2005 and 2016. Maintaining this governance structure is important, as it ensures staff support and institutional stability. Regular and informal dialogue between the chairman of the Board, the general director and the Assembly is key for advancing collective thinking and fostering a climate of trust.

The Institute's management is currently highly centralized around the general director. The scientific departments and the 142 research units have limited responsibility for strategic implementation and resource management. To improve operational efficiency, these departments could be granted broader responsibilities, particularly in scientific objectives and resource management.

The *Institut Pasteur*'s strategic ambitions must be supported by a sustainable economic model. Donations and income from commercialization will remain key, along with competitive research contracts. Ensuring expenditure is well matched to scientific priorities will support the Institute's strategic development.

* * *

The end of this conclusion presents a high-level summary of observed strengths and weaknesses of the *Institut Pasteur*, and recalls the main recommendations.

1 / Strengths

The *Institut Pasteur* enjoys a very impressive set of strengths.

- The Institute has a very strong reputation, including well-established recognition of scientific excellence at the world level and a high renown in French society.
- It has developed a very high quality of support provided to research teams, covering all areas.
- It has also developed a best-in-class pool of cutting-edge technology platforms, with the high-level skills needed to operate them.
- The staff of the Institute – and all staff working on the campus – are strongly committed, with a high level of pride and sense of belonging.
- The organization of research in small and autonomous teams is lively and dynamic, with new teams being created on a regular basis, headed up by newly-hired leaders.

- The Pasteur network is a unique worldwide platform for cooperation in health research and education, as well as in public health, and it has a new and clearer strategy.
- The Institute has a strong and long-standing commitment to research ethics and scientific integrity, and it is heavily involved in open science.
- It benefits from a diversified economic model with substantial endowment and fundraising.

2 / Weaknesses

The weaknesses listed below should not be seen as criticism: they are identified to help the Institute further develop and reach its full potential. Several of them are, in one way or another, the 'mirror' of some of the strengths listed above.

- There is a certain lack of openness – or a certain risk of insularity.
- It would be useful to further clarify the Institute's position in the French research system and the French health system, the balance of its commitment to its four missions and their *continuum*, and the main objectives in its strategy. This would help to clarify and improve its image in the eyes of the French authorities, partners and society at large.
- The Institute has not articulated a clear strategy to assert its European leadership in some key areas where it should be a reference point.
- The Institute has a complex internal organization and management. It should improve its ability to implement its strategy and its ability to coordinate its research teams and mobilize them in joint projects.
- The Institute may not be fully prepared to face the perspective of numerous retirements of senior researchers in the coming years, and it will be important to ensure steps are taken to attract mid-level and senior scientists.
- Budget steering and management should be improved, both for forecasting expenses and monitoring them, at annual and multiannual levels, as well as the ability to master the economic model of its contractual research activities.

3 / Main recommendations

Recommendation 1 Reflect on the Institute's main missions (research, innovation, training and public health), reaffirm or redefine its position and how it exercises them, and clearly communicate externally. This will help ensure a better match between what the *Institut Pasteur* does and does not do and the public and government perception of its role.

Recommendation 2 Reinforce the quest for world-class research excellence and focus on areas where the *Institut Pasteur* is well placed to make major contributions.

Recommendation 3 Integrate management and operations with the scientific strategy, develop performance indicators that support aligning the allocation of resources towards scientific ambitions, while also measuring the output in terms of results, value for money and impact for society.

Recommendation 4 Increase the Institute's outward-facing position and openness, and increase its partnership activities with national and international organizations. Combining different kinds of expertise is expected to yield a wider range of discoveries and greater benefits for health. The *Institut Pasteur* has the history, stature and unique qualities to assume a coordinating role in European research projects in major areas.

Recommendation 5 Continue the reforms of the Pasteur network already underway towards a multilateral, more equitable partnership model. Strongly encourage joint working where scientific objectives align and mutual movement of staff between different members of the network.

Recommendation 6 Improve the attractiveness of senior positions to international researchers and work towards a more open, diverse and inclusive workforce in order to broaden the experience and expertise of the staff body.

Recommendation 7 Further develop fundraising and commercialization to reinforce financial sustainability, and improve the cost recovery from contract research activities.

Observations of the general director of the *Institut Pasteur*

Professor Yasmine Belkaid

18th December 2024

Subject : HCERES Evaluation Report – President observation letter

The Institut Pasteur welcomes the high-quality evaluation conducted by Hcéres, an essential exercise to ensure the excellence of our scientific mission while reinforcing public trust in our institution.

On behalf of the Institut Pasteur, I would like to sincerely thank the committee experts and the Hcéres teams for their meticulous work and for taking into account the unique features of our organization—namely, our status as a private foundation recognized as serving the public interest and our diversified economic model, which relies extensively on public generosity.

We welcome this report, which captures both the strengths of the Institut Pasteur—such as its international scientific reputation and its cutting-edge research activities—and the challenges it faces in continuing to fulfill its mission within a rapidly evolving world. The findings and recommendations made in the report align closely with the strategic reflections I have initiated with the Institut Pasteur teams as part of the "Pasteur 2030" strategic plan, which will be unveiled in early 2025.

The Hcéres report highlights the many strengths of the Institut Pasteur, particularly our renowned international standing, the excellence of our research, and our pioneering role in advancing innovation, technology transfer, and global scientific education. It also commends our strong commitment to scientific integrity and ecological transition. These shared observations reinforce the unique potential of the Institut Pasteur to address major scientific challenges in service of global human health, both today and in the future.

At the same time, the report makes several pertinent recommendations designed to help the Institut Pasteur maintain its scientific excellence and advance its historic missions amid a context of significant budgetary constraints.

To enhance the quality of our research and extend its impact, Hcéres suggests refocusing activities around key scientific priorities. This recommendation is at the heart of the "Pasteur 2030" strategic plan, which outlines four major areas of focus for the years ahead. These priorities build on our historical expertise and aim to amplify the societal impacts of our research both in France and internationally:

1. Environmental transitions and health, to better understand how climate change impacts human health.
2. Threats related to infectious diseases, including the fight against antimicrobial resistance.

Public interest foundation authorized to receive donations and bequests
Institut Pasteur, 25-28 rue du Docteur Roux - 75724 Paris Cedex 15
Direction-generale@pasteur.fr

3. Origins of diseases, by deciphering the mechanisms underlying chronic and inflammatory diseases.
4. Health across the extremes of life, by addressing scientific challenges surrounding maternity, childhood, and aging.

In parallel, and consistent with the Hcéres report's recommendations, we will strengthen the synergies between our missions in research, innovation, education, and public health. This includes extending collaborative efforts on both national and international levels.

Furthermore, ensuring the Institut Pasteur's independence and sustainability requires a robust economic model. In line with "Pasteur 2030," we have initiated core efforts to develop and diversify our funding sources. These efforts, also echoed in the Hcéres report, revolve around the following initiatives:

- Collaborating with the French government to define our public-interest missions in research and public health and to explore potential adjustments to public funding allocations.
- Expanding fundraising campaigns to strengthen and protect our endowment fund.
- Developing collaborative projects with academic, industrial, and institutional partners.
- Optimizing the management of our assets and resources.

To accelerate this transformation, we have recently created a consultative group of experts tasked with equipping the Institut Pasteur with a sustainable economic model and building our capacity to address global scientific challenges.

In our commitment to transparency with public institutions and citizens, the Institut Pasteur will regularly communicate updates on the implementation of these recommendations as part of the new strategic plan.

Once again, we extend our sincere gratitude to Hcéres for their expertise and support, which will enable us to consolidate the unique role of the Institut Pasteur within the global scientific ecosystem.

Professor Yasmine Belkaid
President, Institut Pasteur

Public interest foundation authorized to receive donations and bequests
Institut Pasteur, 25-28 rue du Docteur Roux - 75724 Paris Cedex 15
Direction-generale@pasteur.fr

Members of the assessment committee

Liam SMEETH

Chair of the assessment committee

Director of the London school of hygiene and tropical medicine

Liam Smeeth is a professor of clinical epidemiology. He has been director of the London School of hygiene and tropical medicine (LSHTM) since 2021. He is also a practicing doctor in general practice.

Much of his research is based on making better use of computerized clinical data for research, and he co-led the creation of the OpenSafely resource in response to the Covid pandemic. His broad interests include disease aetiology, drug effects, genetics and non-communicable diseases in low-income settings. During his career, he has been supported by fellowships from the Medical research Council (MRC), the National institute for health and care research (NIHR) and Wellcome. He was previously a trustee of the British Heart Foundation and a non-executive director of the Medicines and healthcare products regulatory Agency.

Since 2017, he has been a member of the strategic oversight committee for UK Biobank. He has been an elected fellow of the Academy of medical sciences in the UK since 2016.

Michel EDDI

Vice-chair of the assessment committee

Former senior officer for sustainable development at the French ministry of higher education and research

After graduating from two engineering schools, Michel Eddi defended his doctorate in energy physics in 1980 at the University of Provence. He was then recruited as a researcher by the *Commissariat à l'énergie atomique* (CEA) for 8 years.

In 1988, his graduation from the *École nationale d'administration* (*ENA*) marked a turning point in his path as he gave up his career as a researcher to devote himself to the management of research institutions and to defining and steering public policies in various public entities. He was deputy chief executive officer (CEO) for resources at *Inra* (the French research institute for agriculture) from 2005 to 2013, and chairman of the board and CEO of *Cirad* (the French agricultural research centre for international development) from 2013 to 2021. He was senior officer for sustainable development at the ministry of higher education and research from 2022 to 2024.

Anne BERTOLOTTI

Head of the Neurobiology Division, MRC Laboratory of molecular biology, Cambridge, United Kingdom.

Anne Bertolotti obtained her PhD in 1998 from Strasbourg University (France) working on transcription. She did her post-doctoral research at the Skirball Institute of biomolecular medicine, NYU medical centre, New York.

She was an *Inserm* investigator from 2000 to 2006 and she joined the MRC laboratory of molecular biology (MRC-LMB) at Cambridge, UK, in 2006 as a group leader. She has been head of the Neurobiology Division at MRC-LMB since 2022. Anne Bertolotti has made seminal contributions to the understanding of protein quality control mechanisms, the cellular defence against the harmful proteins that accumulate in neurodegenerative diseases as well as their manipulations for therapeutic benefits.

She was elected as European molecular biology Organization (EMBO) young investigator in 2005 and was awarded a European research Council (ERC) consolidator grant in 2013. She became an EMBO member in 2013 and won the Hooke Medal in 2014. In 2017, she became a fellow of the Academy of medical sciences in the UK and received a Wellcome trust investigator award. In 2018, she won the GlaxoSmithKline award from the Biochemical Society.

Elena CATTANEO

Professor of pharmacology and director of the Laboratory of stem cell biology and pharmacology of neurodegenerative diseases, University of Milano, Italy.

Elena Cattaneo is a full professor of pharmacology at the University of Milano. She leads the laboratory of stem cell biology and pharmacology of neurodegenerative diseases, at the Department of biosciences at the University of Milano where she studies Huntington's disease with the aim of understanding its pathogenic mechanisms. She is also the co-founder and director of UniStem, the University of Milano's Centre for stem cell research.

She graduated in pharmacy in 1986 and obtained a PhD in biotechnology applied to pharmacology from the University of Milano. She spent 3 years working in the Department of brain and cognitive science at MIT (Massachusetts Institute of technology). She has been teaching as a full professor at the University of Milano since 2003.

Elena Cattaneo is the author of the books 'Every day between science and politics' (Mondadori, 2016) and 'Armed with science' (Cortina, 2021). She is a member of the Accademia dei Lincei. In 2013, she was appointed life senator for scientific merits by the president of the Italian Republic.

Christopher DYE

Professor of epidemiology, Oxford University, United Kingdom, and former director of strategy of the World Health Organization.

Christopher Dye trained as a biologist and ecologist at York University, UK (1975-1978), but postgraduate research on mosquitoes (Oxford 1982) led to a career in epidemiology and public health, principally at Imperial College, the LSHTM and the World Health Organization (WHO), which he joined in 1996. As WHO director of strategy 2014-2018, he served as science advisor to the director general, oversaw the production and dissemination of health information by WHO press and libraries, and coordinated WHO's work on health and the sustainable development goals (SDGs). After years of research on HIV/AIDS, tuberculosis, malaria and the Ebola and Zika viruses, he spent much of 2020-2022 investigating Covid-19 in Brazil, China and Europe.

He is a fellow of the UK Royal Society and the UK Academy of medical sciences. His most recent book is 'The Great Health Dilemma: is Prevention Better than Cure?' (Oxford University Press 2021).

Birgitta HENRIQUES-NORMARK

Professor and senior consultant physician in clinical microbiology at the *Karolinska Institutet* and Karolinska University Hospital, Stockholm, Sweden.

Birgitta Henriques-Normark's research focuses on respiratory tract infections, especially pneumococcal diseases. The approach is translational, from basic mechanisms of pathogenesis to epidemiological and clinical studies.

She obtained her PhD in microbiology at the *Karolinska Institutet* in 2000. She has had several leadership appointments at the Swedish Institute for infectious disease control and at the *Karolinska Institutet*, such as vice dean for recruitment and academic vice president for research. She is associated with the public health Agency of Sweden.

She is an elected member of the European Academy of microbiology, the American Academy of microbiology, the European molecular biology Organization (EMBO), and is part of the Nobel assembly at the *Karolinska Institutet*. She is also a member of the Royal Swedish Academy of sciences. She has received awards such as the Wallenberg Clinical Scholars, the Petterkofer Award, the Prix Aboensis Prize and a Torsten Söderberg Academy professorship. She was elected president of the Royal Swedish Academy of sciences in 2022.

Beate KAMPMANN

Professor of global health and scientific director of the Charité centre for global health and the *Institut für internationale Gesundheit*, Berlin, Germany.

Beate Kampmann holds an MD from *Köln Universität* and she defended her PhD in microbiology and immunology in 2000 at Imperial College London.

She trained as a clinician-scientist in Germany, France, the USA, South Africa and the UK. She worked in the UK in both research and in the National health service (NHS) for 25 years. In 2018, she joined LHSTM where she became professor in paediatric infection and immunity, and director of the vaccine centre. Over the last 12 years, she has divided her working time between London and The Gambia, West Africa, where she led the vaccine research at the MRC Unit-The Gambia in West Africa and where her research projects and PhD student supervision continue.

Since 2023, she has been professor of global health and scientific director of the Charité centre for global health and the *Institut für internationale Gesundheit*, Charité Virchow campus in Berlin. She is a fellow of the Academy of medical sciences in the UK, of the Royal College of paediatrics and child health in the UK and of the West African College of physicians.

Pietro LIÒ

Professor of computational biology, University of Cambridge, UK.

Dr Pietro Liò is a full professor at the Department of computer science and technology of the University of Cambridge and is a member of the Artificial intelligence (AI) group.

He received an MA from Cambridge and a PhD in complex systems and nonlinear dynamics from the University of Firenze (1995), as well as a PhD in theoretical genetics from the University of Pavia (Italy). His research focuses on developing artificial intelligence and computational biology models to understand disease complexity and address personalized and precision medicine. The current focus is on graph neural network modelling.

He is a member of various organizations, including the Cambridge centre for AI in medicine, the Cambridge BIG data, and the Academia Europaea. He has been awarded many grants. His current grants include from the Mark Foundation, Horizon 2020, Nerc, GSK and AstraZeneca, EPSRC (Engineering and physical sciences research Council) and Armstrong.

Conduct of the assessment

As described in the introduction above, the assessment began with several meetings between the *Institut Pasteur* and *Hcéres*, which made it possible to elaborate the *Terms of reference* for the assessment[44], published in June 2023. The Institute prepared its self-assessment report between June 2023 and January 2024.

The assessment committee had two videoconference meetings ahead of the assessment visit, one in January 2024 and one in April 2024. The committee sent written questions to the Institute in February and in April.

The assessment visit took place on the Pasteur campus in Paris between 18 and 20 June 2024. Its programme included 46 interviews or meetings.

- Most of the interviews were held with individuals from the *Institut Pasteur*:
  - the general director, with the two deputy general directors,
  - the chairman of the Board of directors (BoD),
  - members of the Office of the BoD and external members of the BoD,
  - members of the Assembly of 100,
  - the chair and vice-chair of the Scientific Council,
  - the chairman of the Scientific advisory board,
  - the chairwoman of the Institute's main ethics committee,
  - several scientific department directors and research group leaders,
  - several elected staff representatives,
  - several PhD students and postdoc researchers,
  - and various *Institut Pasteur*'s officers in charge of the main topics addressed in this report: scientific policy, platforms, open science, public health, innovation, training activities, communication, European and international cooperation, HR policy, financial sustainability, environmental impact, etc.
- 12 Interviews were held with the *Institut Pasteur*'s partners and stakeholders such as *AP-HP*, *CNRS*, *Inserm*, *Université Paris Cité* and *Santé publique France*, and also with European and international partners, with the president and executive director of the Pasteur network, and with partner private companies and startup companies.

The programme of the visit also included several meetings of the assessment committee on its own, to share the main observations and learnings from the interviews and meetings, and to start identifying the key points of the assessment report. The committee then worked on writing the assessment report, which was reviewed with *Hcéres* and collegially approved by the assessment committee.

The assessment report was then submitted to the *Institut Pasteur* for comments on any factual errors, omissions, misunderstanding, inappropriate wording or ill-founded assertions. Lastly, the general director of the *Institut Pasteur* was invited to write her observation letter, which is inserted in the public version of the assessment report.

The assessment process was supported by the team of the department of the assessment of national research organizations of *Hcéres*.

[44] See https://www.hceres.fr/sites/default/files/media/downloads/terms-reference-assessment-institut-pasteur.pdf.

List of acronyms

A

AICD	Audit and internal control department
AP-HP	*Assistance publique des hôpitaux de Paris*

B

BoD	Board of directors

C

CEO	Chief executive officer
Cirad	*Centre de coopération internationale en recherche agronomique pour le développement* (French agricultural research centre for international development)
CMTV	*Centre de recherche sur les maladies à transmission vectorielle* (Centre for research on vector borne diseases)
CNRS	Centre national de la recherche scientifique
Comesp	*Comité d'évaluation scientifique des personnels* (Scientific staff evaluation committee)
CVI	Centre for vaccinology and immunotherapy

D

DARRI	*Département des applications de la recherche et des relations industrielles (*Research applications and industrial relations department)
DMP	Data management plan

E

EMBO	European molecular biology organization
EPFL	*École polytechnique fédérale de Lausanne*
ERC	European research Council
EU	European Union

G

G5 or G5+	Junior 5-year research group

H

Hcéres	*Haut Conseil d'évaluation de la recherche et de l'enseignement supérieur*
HIV	Human immunodeficiency virus
HR	Human resources

I

INRAE	*Institut national de recherche pour l'agriculture, l'alimentation et l'environnement* (National research Institute for agriculture, food and the Environment)
Inserm	*Institut national de la santé et de la recherche médicale* (National Institute for health and medical research)

L

LSHTM	London School of hygiene and tropical medicine

M

MRC	Medical research Council

N

NIH	National Institutes of health
NRC	National reference centre

O

OST	*Observatoire des sciences et techniques*

P

PN	Pasteur network

S

SAB	Scientific advisory board
SAR	Self-assessment report
SC	Scientific Council
SpF	*Santé publique France*

T

TD	Technology department

U

U5	5-year research unit
U10	10-year research unit
UK	United Kingdom
UMR	*Unité mixte de recherche*
UPC	*Université Paris Cité*
USA	United States of America

W

WHO	World Health Organization
WHO-CC	World Health Organization-Collaborating centre

The assessment reports of Hcéres
are available online: www.hceres.fr/en

Assessment of universities and schools
Assessment of research units
Assessment of academic programmes
Assessment of national research organizations
International assessment and accreditations

Evaluation · Research · Higher Education
Hcéres

2 rue Albert Einstein
75013 Paris, France
T.33 (0)1 55 55 60 10

hceres.fr/en @Hceres_ Hcéres